QiR

THE 15th INTERNATIONAL CONFERENCE on QiR

(Quality in Research)

PROGRAM BOOK

ISSN: 1411-1484

Organized by:

UNIVERSITAS INDONESIA

FACULTY OF ENGINEERING

in conjunction with:

IEEE 6th IEEE International Conference on Advanced Logistics and Transport (ICALT 2017)

SAREK International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA)

International Conference on Dwelling Form I-DWELL

3rd Binnual Meeting on Bioprocess Engineering

isBE 2nd International Symposium on Biomedical Engineering

Co-Hosted by:

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24-27 July 2017

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PREFACE

WELCOME FROM THE RECTOR OF UNIVERSITAS INDONESIA

It is both a pleasure and honor for me to welcome you all to the 15th International Conference on QiR (Quality in Research) 2017 in Nusa Dua, Bali, Indonesia.
Universitas Indonesia strives to be one of the leading research universities and the most outstanding academic institution in the world. UI is distinctive among research universities in its commitment to the academic invention and research activities through various scientific programs. QiR 2017 is our main academic conference in the field of engineering and technology which has been successfully held for the last two decades. It is our hope that this world class scientific program would showcase our scientists and researchers achievements and provide forums for scientific exchanges in their respective fields.

The theme this year of 'Science, Technology and Innovation for Sustainable World', is very relevant with the fact that the globalization today results in very competitive atmosphere in all aspects. However, this flourishing competition should consider the harmony and balance between human needs and the environment quality for creating favorable sustainable future. Scientists and researchers, hand in hand with industrial experts are creating and developing new sustainable technologies that enable us to make products and services more efficient, design better buildings, produce safer cars, keep people healthier and building smarter cities.

I extend my sincere thanks to the Faculty of Engineering Universitas Indonesia, supporting parties and institutions for their participation and contributions in QiR 2017. I would also thank our colleagues from Universitas Udayana and Politeknik Negeri Bali for their gracious support and hospitality. Additionally, I extend a hearty thank you to the members of the organizing committees for dedicating their valuable time so that each one of us enjoys an exceptional conference program over the next several days. May we have a successful, stimulating, fruitful and rewarding conference.

Prof. Dr. Ir. Muhammad Anis, M.Met.
Rector
Universitas Indonesia

PREFACE

WELCOME FROM THE DEAN OF FACULTY OF ENGINEERING UNIVERSITAS INDONESIA

Welcome to the 15th International Conference on QiR (Quality in Research) 2017. The Faculty of Engineering Universitas Indonesia is delighted to host our flagship international academic event this year back in Bali, Indonesia. This two-day, biennial conference is presented together with our co-hosts Universitas Udayana and Politeknik Negeri Bali with the hope that this would be able to provide an international media for exchange of the knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of science, technology and innovation.

The main theme for this year conference, "Science, Technology and Innovation for Sustainable World" is consistent with the mission of our faculty to be a leading institution with the initiatives that responds to local, national and global societal needs. In that context, the Faculty of Engineering Universitas Indonesia is performing state-of-the arts research and development in engineering and architecture areas which results in technology and innovation which contribute to sustainable development at both national and global level. QiR 2017 provides platforms and forums to disseminate our scientific achievements and exchange information with our counterparts from Indonesia and all over the world. This event will allow for further research and education collaborations between Universitas Indonesia and its partners worldwide.

I would like to express my deepest appreciation to our sponsors, supported parties and various contributors for their never ending supports of this conference. I would also like to convey my gratitude to all of our distinguished speakers for making the time to share their knowledge with us. To our fellow researchers and/or practitioners from Indonesia and overseas, welcome and enjoy your stay in this Nusa Dua, Bali. I would also like to invite all participants in expressing our appreciation to all members of the QiR 2017 organizing committee for their hard work in making this conference success.

Prof. Dr. Ir. Dedi Priadi, DEA
Dean Faculty of Engineering
Universitas Indonesia

PREFACE

WELCOME FROM THE QiR 2015 ORGANIZING COMMITTEE

On behalf of the organizing committee, it is a great pleasure for us to welcome you to the 15th International Conference on Quality in Research (QiR) 2017 to be held in Bali, Indonesia on July, 24 – 27, 2017. This biennial event is co-organized with the Faculty of Engineering Universitas Udayana and Politeknik Negeri Bali.

The main theme for this year conference is "Science, Technology and Innovation for Sustainable World". Under this theme the conference focuses on the innovative research and contribution in science and technology toward achieving sustainable world. In line with this theme, it is our utmost pleasure to hold the QiR 2017 in conjunction with the 6th IEEE-International Conference on Advanced Logistics and Transport (ICALT), the 2nd International Symposium on Biomedical Engineering (ISBE 2017), International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA) and the 3rd Biannual Meeting on Bioprocess Engineering.

The QiR 2017 brings together national and international academicians, researchers, executives, government, industrial and business officials, practitioners and leaders to present and discuss a vast range of engineering, architectural designs and community development based on green and smart technology. It is our hope and aim that this conference would be able to provide an international media for exchange of the knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of science, technology and innovation. Furthermore, QiR 2017 benefits industry sector, since it would create a close contact between and among the audiences. The audiences mostly come from different job and activities: therefore this is a great potential and opportunity to meet each other, creating fruitful discussions and broaden business relationship.

QiR has been growing, since its first event two decades ago, into our flagship academic event with international reputation. This year, we have received almost 1000 submissions from more than 26 countries. Along with our events in conjunction, more than 500 oral and poster presentations is scheduled with expected 700 participants gather in the event.
On behalf of QiR 2017 committee, we would like to thank all of our speakers, participants, contributors, partners and professional associations for their generous contributions. We also would like to acknowledge the support from our International Advisory Board members and distinguished reviewers. Last but not least, a special thanks to our local co-organizer, Universitas Udayana and Politeknik Negeri Bali.
We wish all of you a productive and rewarding conference, also a pleasant and memorable stay in Nusa Dua, Bali, Indonesia.
Thank you and we hope to see you again in QiR 2019.

Ardiyansyah, Ph.D.
General Chair of QiR 2017 Organizing Committee

KEYNOTE SPEAKER

- **Dr. Thomas J. Goldsby** | Ohio State University, USA.
- **Prof. Jackie Yi-Ru Ying** | Institute of Bioengineering and Nanotechnology in Singapore
- **Prof. Dr. Drs. Benyamin Kusumoputro, MSc.** | Universitas Indonesia, Indonesia

INVITED SPEAKER

- **Dr. Bambang Trigunarsyah, Ph.D., PMP.** | King Fahd University of Petroleum and Minerals, KSA
- **Prof. Dr. rer. nat. habil Uwe Lahl** | Technische Universitat Darmstadt (TUD), Germany
- **Dr. Guillermo Rein** | Imperial College London, United Kingdon
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The 15th International Conference on QiR (Quality in Research) Organizing Committee wishes to express its gratitude and appreciation to :

Prof. Dr. Ir. Muhammad Anis M.Met., Rector of Universitas Indonesia
for consenting to be the guest of honour

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OPERATIONS AREA

OIL & GAS

SENORO

Located in Central Sulawesi near the town of Luwuk, the Senoro gas field currently produces over 300 MMSCFD. The field was placed into service in July 2015 with a total investment of approximately US$ 900 million including exploration.

The gas is delivered to the Donggi Senoro LNG (DSLNG) facility and to the local ammonia producers.

BLOCK B

MedcoEnergi operates the South Natuna Sea Block B PSC which offshore facilities comprises of one FPSO unit, one FSO unit, four central processing platforms, seven wellhead platforms, four producing subsea fields and a large support base in Midai, Anambas island.

The infrastructure supports three producing oil fields and 10 natural gas fields in various stages of development, 8 of which are currently producing. Belanak FPSO is one of the most complex offshore production facilities in the world, equipped with hydrocarbon processing facilities, oil storage and a gas plant to extract liquid petroleum gas (LPG) from a natural gas flow.

In addition, MedcoEnergi also operates the 656 km pipelines of West Natuna Transportation System (WNTS) to transport gas from the Natuna Sea to Singapore and Malaysia.

BLOCK A

MedcoEnergi is progressing the development of Block A gas project in East Aceh Regency. It is expected to deliver 83 BBTUD of gas by Q1 2019 to the domestic market.

In conjunction with the project, we continue to support the development of the local communities, including health care, by building a well-equipped hospital at Idi Rayeuk.

The DSLNG is the 4th LNG plant in Indonesia and is the first to be developed jointly by the national companies. MedcoEnergi, Pertamina, Mitsubishi and KOGAS.

Located in Central Sulawesi, the total investment for this project amounts to US$ 2.8 billion, with production of 2 million tons of LNG per year.

POWER

Medco Power Indonesia is a significant Independent Power Producer in Indonesia. Through Sarulla project, we have extended our commitment to promote clean and environmental-friendly energy for Indonesia.

In addition to that, Medco Power Indonesia owns and operates 306 MW gas power plants in Batam and South Sumatera, conducts operation & maintenance for 1,035 MW Tanjung Jati B Power Plant in Jepara and also 560 MW/760,000

In 6 other locations within Indonesia. Currently the company is also developing 40 MW COTP in Tanjung Umang Batam, 35 MW mini hydro power plant in West Java and West Sumatera, 110 MW geothermal power plant in Jeni and 275 MW gas power plant in Riau.

MINING

MedcoEnergi owns an effective 41.10% interest in the Batu Hijau Mine, via its holding, PT AMNT. The site which is a large open pit porphyry copper and gold deposit mine is located on the island of Sumbawa, West Nusa Tenggara. The concentrate is transported to the port via an 18 km long pipeline where it is filtered, dried and shipped to the markets.

The supporting facilities include a 120,000 tons per day ore processing plant, two SAG mills, four ball mills with a flotation circuit, a 156 MW coal fired power plant, a deep water port, ferry terminal, air services and others.

We implement the Deep Sea Tailing Placement (DSTP) system which has been specifically designed for disposing the production tails in an environmentally responsible manner and approved by the Government of Indonesia.

The Ministry of Environment and Forestry of Indonesia awarded the company 7 consecutive GREEN PROPER awards for the company's performance and commitment to environmental management.

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Teknik Elektro
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KEYNOTE SPEAKER

Thomas Goldsby
Ohio State University

Dr. Thomas J. Goldsby is a Harry T. Mangurian, Jr. Foundation Professor in Business and Professor of Logistics at The Ohio State University. He holds a B.S. in Business Administration from the University of Evansville, M.B.A. from the University of Kentucky, and Ph.D. in Marketing and Logistics from Michigan State University. He is the Co-Editor-in-Chief of the Journal of Business Logistics and former Editor of Transportation Journal. He serves as Associate Director of the Center for Operational Excellence (COE), a Research Fellow of the National Center for the Middle Market, and a research associate of the Global Supply Chain Forum, all housed at Ohio State's Fisher College of Business.
His research interests include logistics strategy, supply chain integration, and the theory and practice of lean and gile supply chain strategies. He has published more than 50 articles in academic and is the co-author of five books and is a proud recipients of: the Best Paper Award at the Transportation Journal (2012-2013), Bernard J. LaLonde Award at the Journal of Business Logistics (2007), and has twice received the Accenture Award for best paper published in the International Journal of Logistics Management (1998 and 2002). Dr. Goldsby has received recognition for excellence in teaching at Iowa State University, The Ohio State University, and The University of Kentucky.

Jackie Yi-Ru Ying
Institute of Bioengineering and Nanotechnology in Singapore

Prof. Jackie Yi-Ru Ying was born in Taipei in 1966. She earned a B.Eng. degree, graduating summa cum laude from Cooper Union in 1987. She then attended Princeton University, receiving her MA in 1988 and her PhD in 1991, both in chemical engineering. She spent a year as a Humboldt Fellow at the Institute for New Materials in Saarbrücken and researched nanocrystalline materials with Herbert Gleiter. Prof. Ying became a professor in the Department of Chemical Engineering at the Massachusetts Institute of Technology (MIT) in 1992. She was made a full professor in 2001; at 35 she was one of MIT's youngest full professors. She returned to Singapore in 2003 to serve as the first executive director of the Institute of Bioengineering and Nanotechnology, a division of the Agency for Science, Technology and Research (A*STAR). Her research concerns the biomedical and catalytic applications of nanostructured systems and materials.
She was elected to the Singapore Women's Hall of Fame in 2014. She was one of the recipients of the inaugural 2015 Mustafa Prize awarded by the Mustafa Science and Technology Foundation. She was also awarded the "Top Scientific Achievement" award for "her great scientific and technological contributions and achievements to the synthesis of well-designed advanced nanostructured materials and systems, nanostructured biomaterials and miniaturisedbiosystems for various interesting applications".

KEYNOTE SPEAKER

Benyamin Kusumoputro
Universitas Indonesia

Prof. Dr. Drs. Benyamin Kusumoputro, MSc is a Professor in Computer Intelligence in the Electrical Engineering Department, Faculty of Engineering Universitas Indonesia. He was born in Bandung on November 17th, 1957. He graduated from Bandung Institute of Technology in 1981 with a Bachelor Degree in Physics and was awarded a Master of Engineering Science in Optoelectronics and Laser Applications from Universitas Indonesia, and a Doctoral degree in Engineering from Electrical and Electronics Engineering Department, Bio- sensors, Tokyo Institute of Technology, Tokyo, Japan in 1993. His interest area of research includes: Development of Computational Intelligence and Methodology for Artificial Senses.
He is a member of Institute of Electrical Engineering of Japan (IEEJ), International Society for Optical Engineering (SPIE), International Association of Science and Technology for Development (IASTED), and World Scientific and Engineering Academy and Society (WSEAS). Some of the awards he has received are: Bronze Medal of Civil Servant, Government of Indonesia, 2005; University Research Achievement, Universitas Indonesia in 2005; and representing Universitas Indonesia in the National Outstanding Lecture Competition in 2016.

INVITED SPEAKER

Uwe Lahl
Technische Universitat Darmstadt (TUD)

Prof. Uwe Lahl was born on 20 March 1951. Prof. Uwe Lahl holds a doctorate (Dr.rer. nat.) and a professorial degree (PD, Habilitation). Since April 2014, he is Head of the Ministry of Transportation of the German federal state of Baden-Württemberg. Before, he was manager at the BZL Kommunikation und Projektsteuerung GmbH (2009 – 2014) and Head of the Directorate General for Environmental Health, Air Pollution Control, Safety of Installations and Transport, Chemical Safety at the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2000-2009).

Since 2008, he is, too, associated Professor at Technical University of Darmstadt. In 2010, he started teaching at the University of Indonesia at the Faculty of Engineering in the Department of Environmental Engineering and became adjunct Professor at the University of Indonesia in 2011.

INVITED SPEAKER

Bambang Trigunarsyah
King Fahd University of Petroleum and Minerals

Dr. Bambang Trigunarsyah is an Associate Professor in the Construction Engineering and Management Department, King Fahd University of Petroleum and Minerals (KFUPM), Dhahran, Saudi Arabia. He earned his BSc in Engineering (Civil) from Colorado School of Mines in the USA, a Master degree in Civil Engineering (Construction Management) from the University of Indonesia, and a PhD in Engineering Project Management from the University of Melbourne, Australia. Dr. Bambang Trigunarsyah research interests are in the area of: Construction management and economic, Constructability and operability of infrastructure project, Knowledge management in project based organization, Post-disaster reconstruction project management, Quality management in construction, and Infrastructure project delivery and infrastructure asset management.
Previously, Dr. Bambang Trigunarsyah was an Associate Professor and the Course Leaders for Master of Project Management and Master of Infrastructure Management in the School of Civil Engineering and Built Environment, Queensland University of Technology (QUT), Australia, from 2007 to 2013. He continues his association with QUT as an Adjunct Associate Professor. Dr. Bambang Trigunarsyah was the Head of the Civil Engineering Department at Universitas Indonesia (2004-2006) and an Associate Professor in Construction Project Management. Dr. Bambang Trigunarsyah started his full time tenure at Universitas Indonesia in 2001, following the completion of his PhD study from the University of Melbourne, Australia

Guillermo Rein
Imperial College London

Dr. Guillermo Rein studied Mechanical Engineering at University of California at Berkeley (MSc 2003, PhD 2005) and before then was at ICAI Universidad Pontificia Comillas (Ingeniero Industrial, 1999). Dr. Rein is editor in Thermal Energy at the Department of Mechanical Engineering of Imperial College and Editor-in Chief of the Journal Fire Technology. His research is centered on heat transfer, combustion and fire science.

Over the last 15 years, he has been best known in three areas: 1) how polymers and wood ignite and how to avoid it; 2) how engineers can design better structures that resist fires; and 3) how wildfires spread in the forest and how to manage them. Dr. Guillermo Rein is known in the building sector for changing the way UK fire engineers design modern infrastructure. His work has been recognized internationally with a number of research awards (e.g. Lund Award, Wildfire Early Career Award, Hinshelwood Prize, and Distinguished Paper in the Combustion Symposium). Dr. Guillermo Rein has been featured in several international media (e.g. Financial Times, BBC Radio, and New York Times) for his expertise.

INVITED SPEAKER

Jae Dong Chung
Sejong University

Prof. Jae Dong Chung received his Bachelor of Science in 1990 from Seoul National University and continued on to finished his Master of Science in 1992 and Ph.D in August 1996 from the same university. He is currently a Professor at the Department of Mechanical Engineering, Sejong University Korea. His research fields include (1) thermal energy storage and transport; (2) Refrigeration Driven by Low Temperature Energy Sources: Desiccant Cooling, Adsorption Cooling; (3) Phase Change; (4) Nano-scale Heat Transfer.
In 2016, Prof. Jae Dong Chung received the Best Paper Award by Minister of Land, Infrastructure and Transport. He was also awarded as Outstanding Academic Award by Society of Air Air-conditioning and Refrigerating Engineers of Korea in 2014, and also Best Paper Award by Minister of Ministry of Trade Industry and Energy in 2014. Prof Jae Dong Chung also joined professional association i.e. The Korean Society of Mechanical Engineering, Thermal Division as an Director of General Affairs since 2009 until present, Chairperson of the division of Low Temperature Facilities Engineering in SAREK, Vice president of B1 commission of IIR from 2015 until present, International Journal of Air-Conditioning and Refrigeration as an Editor from 2009 until present, Journal of Mechanical Science and Technology as an Associate Editor from 2008 until present and so forth.

Yifan Chen
University of Waikato

Dr. Yifan Chen is a Professor of Engineering and the Associate Dean of External Engagement for the Faculty of Science and Engineering and the Faculty of Computing and Mathematical Sciences in the University of Waikato, Hamilton, New Zealand. His current research interests include electromagnetic medical imaging and diagnosis, transient communication with application to healthcare, touchable communication and computation with application to targeted drug delivery and contrast-enhanced medical imaging, fundamentals and applications of nanoscale and molecular communications, and channel modelling for next-generation wireless systems and networks.
He is the Coordinator of the European FP7 "CoNHealth" project on intelligent medical ICT, an elected Working Group Co-leader of the European COST Action TD1301 "MiMed" project on microwave medical imaging, an Advisory Committee Member of the European Horizon 2020 "CIRCLE" project on molecular communications, a Voting Member of the IEEE Standards Development Working Group 1906.1 on nanoscale and molecular communications, an Editor for IEEE ComSoc Best Readings in Nanoscale Communication Networks and IEEE Access Special Section in Nano-antennas, Nano-transceivers, and Nano-networks/Communications, and a Vice Chair of the IEEE Nano-scale, Molecular and Quantum Networking Emerging Technical Subcommittee. He is a Fellow of IET and a Senior Member of IEEE.

INVITED SPEAKER

Kalamullah Ramli
Universitas Indonesia

Prof. Kalamullah Ramli is a Professor in Computer Engineering since July 1, 2009. He finished his Master in Telecommunication Engineering at University of Wollongong, NSW, Australia, in 1997. He then continued his Doktorarbeit on Computer Networks in year 2000 at Universitaet Duisburg-Essen, NRW, Germany, and obtained his Dr.-Ing. in year 2003. His research interests include embedded system, network and information security, computer and communications, and intelligent transportation system. Prof. Kalamullah Ramli was the Director General of Post and ICT Operations of the Ministry of Communication and Information Technology (2013 - 2016). Prof. Kalamullah Ramli has many collaboration work between universities from German, Italy and Malaysia. One of his collaboration received an "AsiaLink" grant from the European Comission between 2005 - 2007 to deliver an initiative named "Improving Mobility of Student between Europe and ASEAN" which resulted in a prototype model of Credit Transfer System Platform between ASEAN and Europe. Based on this experience he was elected as one of the speaker on ASAIHL Conference on December 2008 in Jakarta. This ASAIHL is managed by ASEAN Universities to implement a platform for Credit Transfer System between Universities in ASEAN.

H.J. (Erik) Heeres
University of Groningen

Prof. Dr. Ir. H.J. Heeres was born in 1963. He graduated in 1990 from the University of Groningen, with a thesis on the development of novel homogeneous lanthanide catalysts for the conversion of unsaturated hydrocarbons. Afterwards, he performed a post-doctoral research at the University of Oxford, in the group of J.M. Brown on asymmetric catalysis from 1990 to 1991. In 1995 he graduated from Technical University Twente in Chemical Engineering and achieved a Master Degree. From 1991 to 1999, he was employed at Shell Research, in Amsterdam and Pernis, and worked on a range of applied catalysis topics. He joined the chemical reaction engineering department of the University of Groningen, in 1999, as an assistant professor. Four years later, he was appointed full professor in green chemical reaction engineering.
His research interest concerns on the development of efficient catalytic technology for acid- and metal-based catalytic biomass conversions, with an emphasis on biofuels (catalytic pyrolysis, pyrolysis oil upgrading), platform chemicals (levulinic acid, hydroxymethylfurfural) and performance materials from biomass (starch modifications). The group is actively involved in national and international consortia (for example, the European Union 6th framework project Biocoup) dealing with catalytic pyrolysis oil upgrading. Prof. Dr. Ir. H.J. Heeres is the (co-) author of 185 papers in international peer reviewed journals (h-index 44) and 12 patents in the field of applied catalysis and chemical reaction engineering. Heeres is also a member of the KoninklijkeHollandscheMaatschappij der Wetenschappen and an associate editor of the Journal of fuel processing technology.

INVITED SPEAKER

Nishikawa Hiroshi
Joining and Welding Research Institute Osaka University

Nishikawa Hiroshi was born at Japan in 1973. He is an Associate Professor at Joining Welding Research Institute, Osaka University from 2007 until present. Nishikawa Hiroshi finished his Bachelor Engineering in 1997 at Department of Welding and Production Engineering, Osaka University and continued to finish his Master of Engineering in 1999 at Department of Adaptive Machine Systems, Graduate School of Engineering, Osaka University. On 2002, he achieved his Doctoral of Engineering from the same university.

Ashok K. Das
University of Hawai'i Manoa

Ashok K. Das, Ph.D received his Bachelor of Architecture from the School of Planning and Architecture, New Delhi India in 1996. He continued to finish his master degree in Environmental Planning and Management at Kansas State University, Manhattan and received his Master of Art and Master of Architecture in 2001. In 2008, he started pursuing his doctoral degree in Urban Planning at University of California, Los Angeles. His research interests revolve broadly around issues of urban poverty in developing countries, primarily in South and Southeast Asia. His current research areas are: (1) community participation and empowerment, (2) slum upgrading, basic services and low-income housing, (3) integrated community-based microfinance for urban poverty alleviation, (4) local planning and governance for disaster preparedness and risk education, and (5) the role of civil society and NGOs in urban planning and development. Currently Ashok is an Assistant Professor at the Department of Urban and Regional Planning, University of Hawai'i. He is also an Affiliate Faculty at the Center for Southeast Asian Studies at the same university. Since 2009, Ashok has been involved with the Cleanopolis Energy System India Private Limited (CESIPL) as an Adviser. He was invited as an expert to a discussion on "Rural-urban linkages and drivers of inequality in Asia" in May 2017 with representatives, directors and vice presidents of the Ford Foundation to explore ways for its global philanthropic mission to transcend the rural-urban dichotomy.

INVITED SPEAKER

Margaret Petty
Queensland University of Technology

Prof. Margaret Maile Petty studied Art History at the University of Oregon, Eugene to obtain her Bachelor of Art with Summa Cum Laude in 2000. After graduation, she continued her study for a Master Degree at The Bard Graduate Center, New York City and obtained her Master of Art in 2002. Before she received her Doctoral Degree in Architectural History at Victoria University of Wellington in 2016, she took the doctoral course work and qualifiying exams at The Bard Graduate Center, New York City in 2005. Currently she is Professor and Head of the School of Design in the Creative Industries Faculty at Queensland University of Technology, Australia. Her research broadly investigates the discourse, production, and consumption practices of the modern built environment, with a particular focus on artificial lighting and interiors. She has published broadly in academic journals such as the JSAH, Journal of Design History, Home Cultures, Interiors, and PLAT and is co-editor of Cities of Light: Two Hundred Years of Urban Illumination (Routledge, 2015), as well as Architectures of Display: Department Stores and Modern Retail (Ashgate, 2017). She is co-founder and member of the Advisory Board of DesignCo, Society of Architectural Historians (SAH), Society of Architectural Historians of Australia and New Zealand (SAHANZ) and International Committee on the History of Technology (ICHOTEC).

Kousuke Hiromori
Tohoku University

Kousuke Hiromori is a Ph.D candidate in the Department of Chemical Engineering, Tohoku University. He was awarded a Bachelor of Science and Master of Science both from Chemical Engineering, Tohoku University. His Thesis topic is: Recovery of Vitamin E from Rice Bran Deodorizer Distillate Using Ion-Exchange Resins.

Kousuke Hiromori has also won ICRBO 2016 Best Poster Presentation Award and Incentive Student Award of the Society of Chemical Engineers' Japan in 2017. His list of publication includes: " Novel simple process for tocopherols selective recovery from vegetable oils by adsorption and desorption with an anion-exchange resin (published in Food Chemistry, 2016), Development of Novel Process for Efficiently Seperating and Purifying Tocotrienols (published in Japan Society for Food Engineering Journal, 2016).

INVITED SPEAKER

Masafumi Yohda
Tokyo University of Agriculture and Technology

Professor Masafumi Yohda received his Bachelor Degree in 1982 from The University of Tokyo and continued to finished his Master Degree in 1984 and Ph.D. in 1987 from the same university. He is a Professor at Department of Biotechnology and Life Science, Tokyo University of Agriculture and Technology from 2003 until now.

Currently, he serves as the Vice Dean of Institute of Global Innovation Research, Tokyo University of Agriculture and Technology. His research interests including Biochemistry, Molecular Biology, Biophysics, System Engineering and Environmental Science. In 1999, Professor Masafumi Yohda was rewarded for the excellent paper award of Journal of Bioscience and Bio Engineering. He joins many professional memberships such as The Japanese Biochemical Society as a Councilor, Protein Society of Japan as a Director, The Society of Biotechnology as a Director, Manager of East Japan Branch, The Chem-Bio Informatics Society as Director.

Mark Harrison
Queensland University of Technology

Dr. Mark Harrison obtained an undergraduate degree in biochemistry from the University of Queensland in 1992. He completed his PhD (2001) at the University of Queensland, researching the molecular mechanisms by which cells transport, store, and detoxify essential metal ions. He then undertook post-doctoral work at Newcastle University (Newcastle-upon-Tyne, UK) researching the biological chemistry of metalloproteins and their role in essential metal ion homeostasis. Dr. Mark Harrison returned to Australia in 2003 and was awarded a 3 year Queensland State Government Smart State Fellowship in 2004 to produce enzymes in a model plant. The development of this technology in sugarcane was a key part of the $3.8 million research collaboration between Syngenta, one of the world's largest integrated agribusiness companies, and QUT.

Dr. Mark Harrison is a biochemist with extensive basic, applied, and commercial research experience. He is a Senior Research Fellow and foundation member of the QUT Centre for Tropical Crops and Biocommodities (https://www.qut.edu.au/research/our-research/institutes-centres-and-research-groups/centre-for-tropical-crops-and-biocommodities). Dr. Mark Harrison also provides consulting services to the Australian food and bio-industrial sector. Research in his group is focused on the conversion of agricultural wastes and residues into more valuable food, feed, fibre, fine chemical, and fuel products, (https://research.qut.edu.au/biorefining/).

INVITED SPEAKER

Joe da Costa
The University of Queensland

Prof. Joe da Costa is an Australian Research Council (ARC) Future Fellow and a Professor in the School of Chemical Engineering at the University of Queensland, Brisbane Australia. He is also the Director of the FIM2Lab – Functional Interfacial Materials and Membranes Laboratory. Prof. Joe da Costa has over 30 years working experience in industrial, consultancy and academic roles in Brazil, England, and Australia. Currently, he leads several research projects in the area of H2, CO2, O2, ethanol separation and desalination using inorganic membranes and membrane reactors, in addition to catalysts for wastewater processing. Prof. Joe da Costa has over 250 international publications including 13 book chapters, and he is an editorial board member of Nature's Scientific Report open source journal. Also, he held a prominent leadership position as a member of the Independent Scientific Panel advising the Queensland Government on underground coal gasification, and a member of the International Panel of Experts assessing the Brazilian programs of Centers of Excellence. His work has been cited over 6800 times, and his h-index is 44. He is a Chartered Professional Engineer in the Colleges of Mechanical Engineering and Chemical Engineering of the Institution of Engineers Australia.

Volkan Degirmenci
University of Warwick

Dr Volkan Degirmenci is an Assistant Professor in School of Engineering in the University of Warwick, UK. Dr. Degirmenci obtained his PhD in Chemical Engineering from Middle East Technical University, Ankara, Turkey, in 2007. Then he joined to the Molecular Heterogeneous Catalysis research group at Eindhoven University of Technology, Netherlands as a postdoctoral fellow in 2008. Next he moved to UK to the Queen's University Belfast in 2012 where he was promoted to Assistant Professor in Chemical Engineering.

Recently he joined the School of Engineering at University of Warwick in 2015. The research interests of Dr. Degirmenci are in the field of heterogeneous catalysis and reactor design with a focus on microporous and mesoporous materials. The topics of his recent research are directed towards the development of sustainable processes for biomass conversion, in-situ spectroscopy for the understanding of the reaction mechanisms and structure-activity relations in heterogeneous catalysis.

INVITED SPEAKER

Marie-Anne Guerry
Vrije Universiteit Brussel

Prof. Marie-Anne Guerry pursues her Doctoral Degree in mathematical sciences on 1985 at Vrije Universiteit Brussel and received her PhD in 1992. At the moment, Prof. Marie-Anne Guerry is a Professor at the Department of Business Technology and Operations, Vrije Universiteit Brussel since 2012. Her research expertise are Markov modeling, manpower planning and career studies.

Prof. Marie-Anne Guerry is an active reviewer for Linear Algebra and its Application, Elsevier (since 2009), British Journal of Applied Science & Technology (since 2013), Applied Mathematical Modelling, Elsevier (since 2013), TOP Journal of Operations Research, Springer Publishing Company (since 2014), Central European Journal of Operations Research, Springer Publishing Company (since 2014), Applied Stochastic Models in Business and Industry, John Wiley & Sons (since 2014), Personnel Review, Emerald (since 2015) and many more.

Pekka Leviakangas
University of Oulu

Prof. Pekka Leviakangas (born in 1962, PhD in technology) has several experiences as an expert in civil service, business and research. He is currently the Principal Scientist at VTT Technical Research Centre of Finland Ltd. In 2012-2016 he acted as Associate Professor at Curtin University in the School of Built Environment, Programme Director of the Australasian Centre for Building Information Modelling and Research Professor at University of Oulu in industrial engineering and management. His previous positions include Chief Research Scientist, Team Leader and Customer Manager at VTT, Vice-President of Jaakko Pöyry Group subsidiary (JP-Transplan), Corporate Analyst of Finnish Railways (VR-Group Ltd), R&D Manager of Finnish National Road Administration's South-eastern region, and private consultant. He was an adjunct professor of Tampere University of Technology in the department of Logistics and Business Information for 2008-2014. His own research covers innovation management, value analysis, impact analysis, service sciences, project finance, investment, financial and socio-economic analysis, restructuring issues and new technology deployment. His primary research area has been on transport sector, but his activities have extended to other fields such as bioeconomy, climate change, meteorology, education, construction and infrastructure management.

INVITED SPEAKER

Peter Simmonds
ASHRAE Instructors

Peter Simmonds is managing director/principal of Building and Systems Analytics LLC. Peter has been involved in the design and operation of tall, supertall and megatall buildings around the world for more than 30 years. An ASHRAE member since 1989, Peter has twice chaired Technical Committee 9.12 Tall Buildings, and is a member of TC 2.1 Thermal Comfort and Human Physiology, and TC 7.5 Smart Building Systems. He also serves on the Standards Committee and is Secretary of the College of Fellows.
Peter has authored or coauthored more than 60 technical papers, articles and books. Most recently, he was the author of the new ASHRAE Design Guide for Tall, Supertall and Megatall Building Systems (2015). He was also a co-author of the ASHRAE/REHVA Active and Passive Beam Application Design Guide (2014).
He has one Bachelor of Science degree in Mechanical Engineering and another in Research and Development from Reading Technical College in England; a Master's degree from Hogere Technische School, Den Bosch, The Netherlands; and a Ph.D. from Technical University of Delft, The Netherlands.

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PRESENTATION GUIDELINE

ORAL PRESENTATION

Please note that the time allocated to each oral presentation is 15 minutes including questions and answers.
PowerPoint slides for presentation on a LCD video projector are recommended.

Oral presentation rooms will be equipped with the following items:

- Notebook computer running WINDOWS operating system, with MS Office 2007, Acrobat Reader 8.0
- An LCD video projector

We recommend that presenters bring their presentation file in a format compatible with one of the above applications, and stored in a USB thumb drive (flash disk).

Alternatively, they can use their own notebook computer. If you choose to use your own notebook computer, we recommend that you bring a backup copy of the presentation in a CD-ROM or a USB thumb drive

All presenters can upload their presentations files into the computer in their presentation files into the computer in their assigned presentation room during Welcome Drink on 24 July, 3-5 pm, or on the morning of their presentation from 08.00 hrs onwards, or during the tea breaks. An assistant will be in the room to help you.
Note:

- AC Voltage is 220 V in Indonesia
- The connector from the LCD projector to your computer is limited to a D-sub 15 pin male connection

POSTER PRESENTATION

Presenters must bring the poster.
You will be provided with a poster board to mount/display your poster. The maximum permitted dimensions for your poster is A1 size.

Posters MUST be in Portrait format. Your poster code will be indicated on the board.

Please note that the width of poster board may not be exceeded under any circumstances.

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Poster Size-A1 size
594 x 841 mm2

Setting Up and Removing Posters
Presenters are responsible for the dismantling of their posters. Posters left behind after 19.00 hrs will be disposed of and are not the responsibility of the organizer.

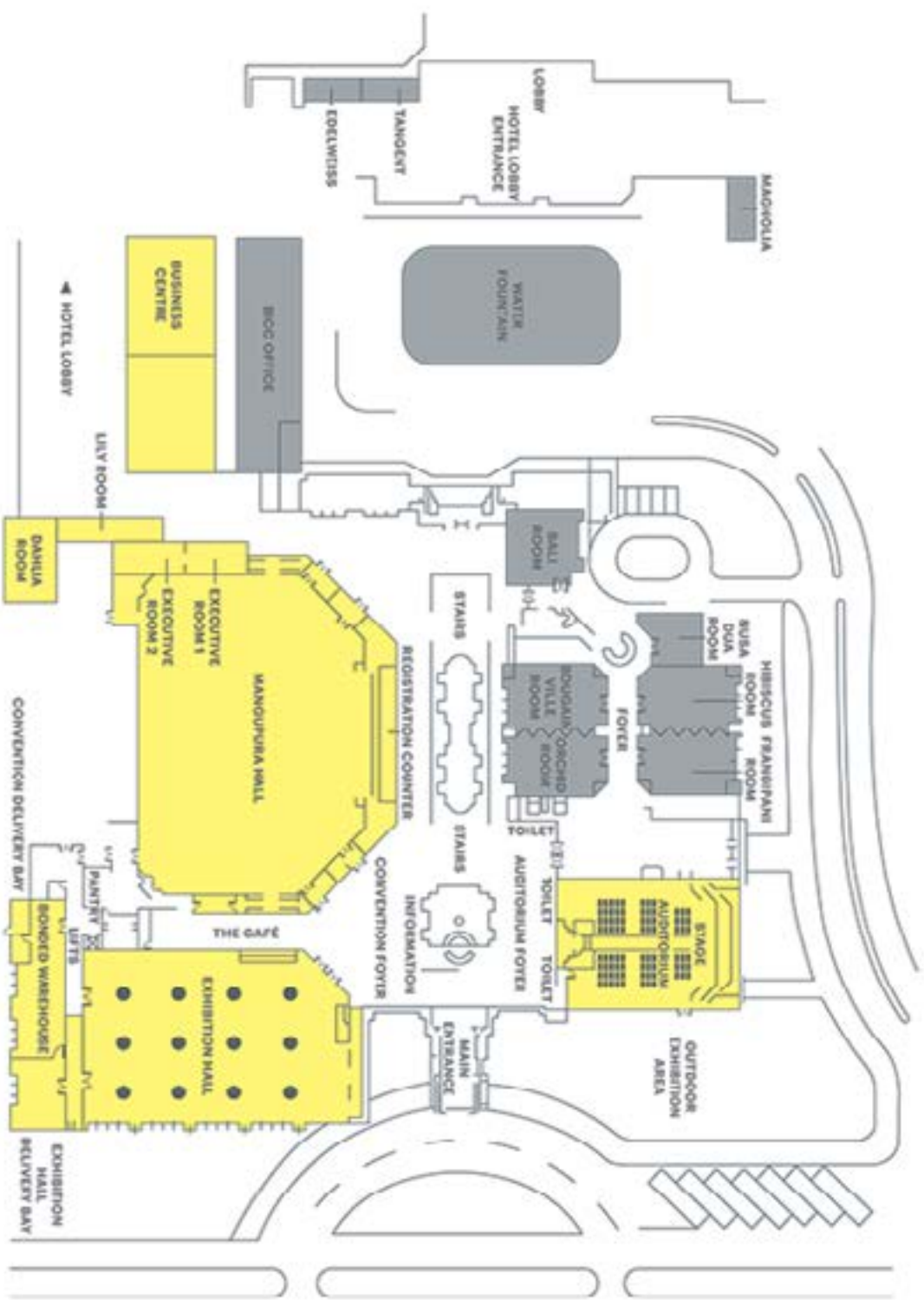
PLACE & DATE OF THE EVENT

Date : 24 – 27 July 2017
Location : BICC the Westin, Nusa Dua, Bali.

The Arrangement of the QiR 2017 Conference can be seen at the table below

Date	Time	Program
24 July	03.00-05.00 p.m	Registration and Welcome Cocktails
25 July	Full Day	Exhibition
	08.30-10.15 am	Opening Ceremony
	10.15-10.30 am	Coffee break
	10.30-11.15 am	Plenary Lecture 1 Prof. Benyamin Kusumoputro
	11.15-12.00 pm	Plenary Lecture 2: Prof. Thomas Goldsby
	01.00-03.00 pm	Parallel Session
		Each parallel session will be started with presentation by Invited Speakers
	03.00-03.30 pm	Poster Session Day 1
		Coffee break
	03.30-06.00 pm	Parallel Session
	06.00-07.00 pm	Poster Session Day 1
	07.00-09.00 pm	Banquette Dinner
26 July	Full Day	Exhibition
	08.30-10.00 am	Parallel Session
		Each parallel session will be started with presentation by Invited Speakers
	10.00-10.30 am	Poster Session Day 2
		Coffee break
	10.30-12.00 pm	Parallel Session
	12.00-01.00 pm	Lunch
		Poster Session Day 2
	01.00-02.00 pm	Plenary Lecture 3 Prof. Jackie Y. Ying
	01.00-03.00 pm	Parallel Session
	03.00-03.30 pm	Coffee break
	07.00-09.00 pm	Dinner and Closing Ceremony
27 July	08.00am-08.00 pm	Social Tour

ACTIVITY LOCATOR



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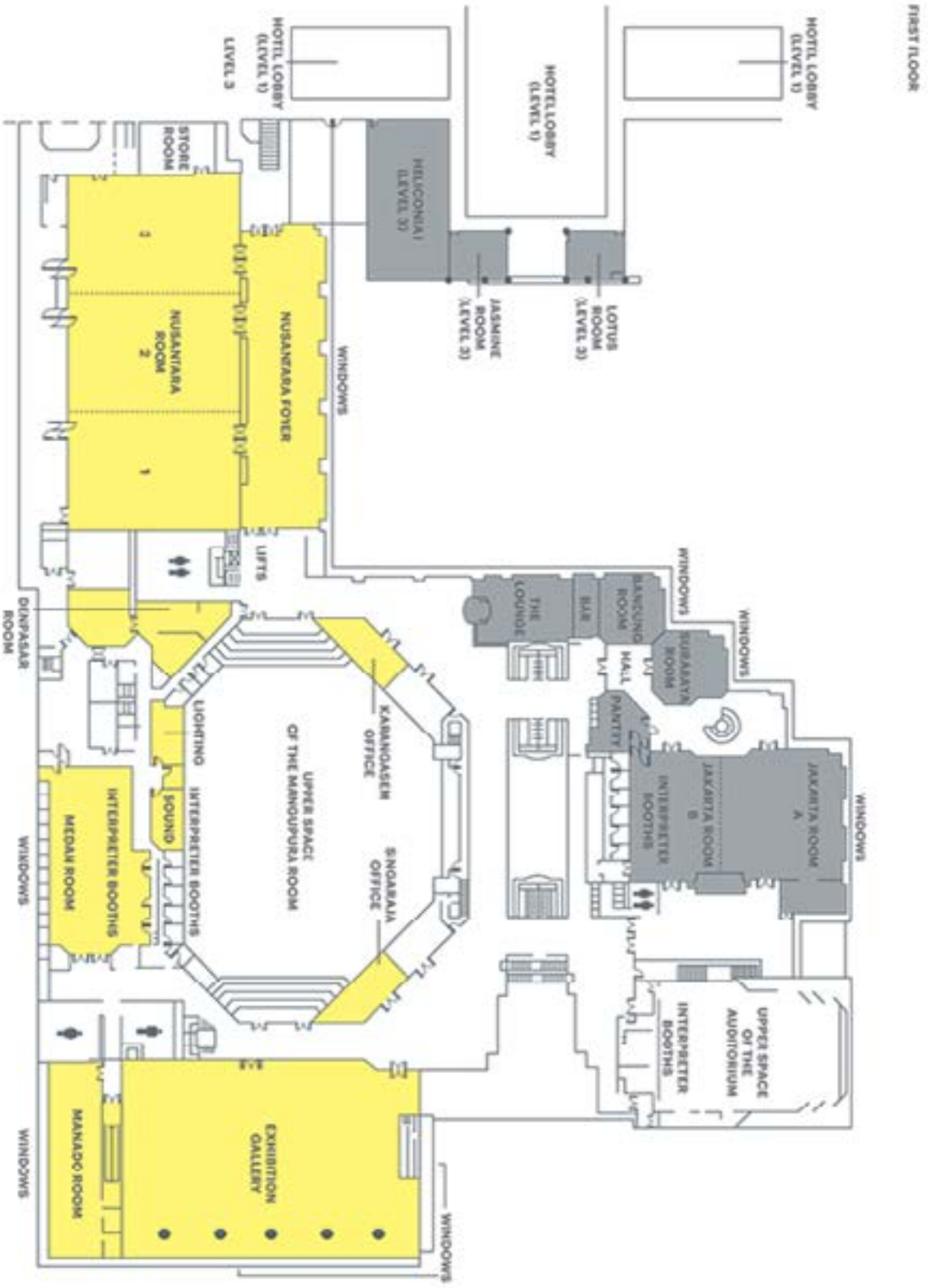

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SESSION LOCATOR

Room	25-Jul-17								
	08.30-10.15 am	10.15-10:30 am	10.30-11:15 am	11.15-12:00 am	12:00-01:00 pm	01:00-03:00 pm	03:00-03:15 pm	03:15-06.00 pm	06:00-07:00 pm
Ballroom Mangupura	**Opening Ceremony**	**Coffee break**	**Plenary Lecture 1: Prof. Benyamin Kusumoputro**	**Plenary Lecture 2: Prof. Thomas Goldsby**		**MAT Plenary MAT 1B**		**CHE 2A**	
Dahlia Room					Lunch break	**IE Plenary IE 1**	Coffee break	**IE 2**	
Bougenville Room						**ISBE**		**ISBE**	
Orchid Room									
Hibiscus Room									
Frangipani Room						**MAT 1A**		**MAT 2**	
Medan Room						**E Plenary E 1**		**E 2**	
Bandung Room						**ME 1A**		**ME 2A**	
Surabaya Room						**ME 1B**		**ME Plenary ME 2B**	
Jakarta A Room						**CE Plenary CE 1A**		**CE 2A**	
Jakarta B Room						**CE 1B**		**CE 2B**	
Jasmine Room			**I-Dwell**			**CHE 1**		**CHE 2B**	
Lotus Room		**I-Dwell**	**I-Dwell**			**I-Dwell**		**I-Dwell**	

SESSION LOCATOR

	26-Jul-17									
07:00-09:00 pm	08.00-10.00 am	10:00-10:15	10.15-12:00 am	12:00-01:00 pm	01:00-02:00 pm	02.00-03.30 pm	03:30-03:45 pm	03:45-06.00 pm	06:00-07:00 pm	07:00-09:00 pm
Dinner	MAT Plenary 2 MAT 3A		E 4C			E 5C				Dinner
	IE 3	Coffee break	IE 4	Lunch break	IE 5A	CE 5	Coffee break	E 6C		
	ISBE		ISBE		IE 5B	MAT 5B				
					IE 5C	MAT 5A		MAT 6		
	CHE Plenary CHE 3B		E 4D		ICALT			ICALT		
	MAT 3B		MAT 4							
	E 3A		E 4A			E 5A		E 6A		
	ME 3		ME 4 / ICSERA		ICSERA			E 6D		
	E3B		E 4B			E 5B		E 6B		
	CE 3A		CE 4A		Special Lecture: Prof. Jackie Ying	ISBE		Workshop on Scientific Publication		
	CE 3B		CE 4B					CHE 6B		
	CHE Plenary CHE 3A		CHE 4			CHE 5		CHE 6A		
	BIO		BIO			BIO		BIO		

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CCIT-FTUI

- Established in 2002 in cooperation with NIIT India as a professional IT program education, customized IT training, IT short course and IT consultant services.
- The first continue study in 2004 with Politeknik Negeri Jakarta
- 2010 - launching IT Banking Syariah program with UIN Jakarta
- 2012 - Launches mobile programs applications
- 2013 - Organizes the IT Cloud Class program
- 2015 - Opens Network Administrator Professional program in collaboration with FTUI Electrical Engineering Department
- 2016 - becomes the NIIT Master Center

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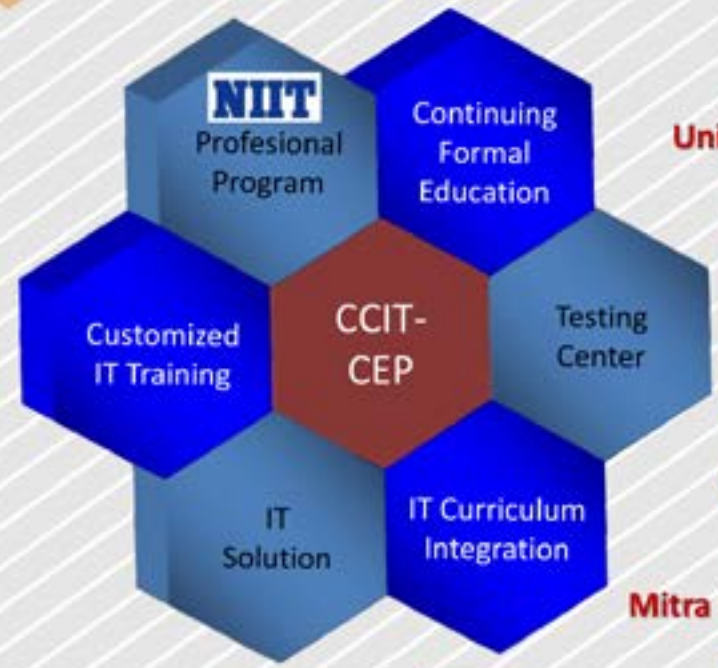
Scope of Business CEP-CCIT FTUI



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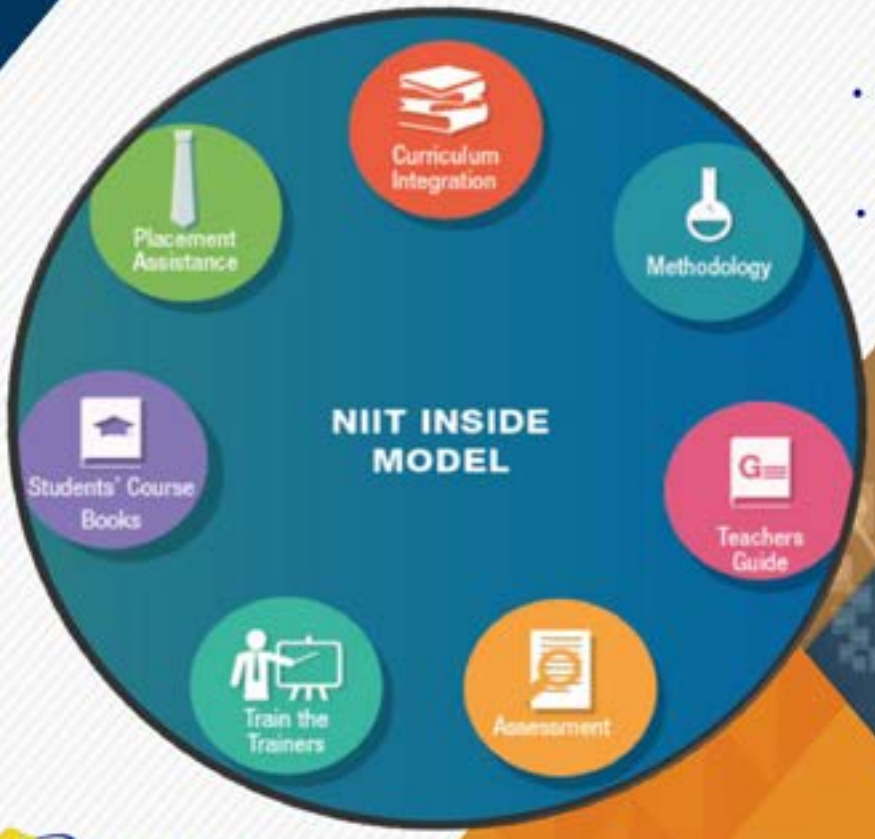

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CE Plenary

Tuesday, July 25, 2017 13.00-13.30

Jakarta A Room 2nd fl

Invited Speaker : Prof. Dr. Uwe Lahl, TU (Technical University) Darmstadt
The importance of pollution control for the acceptance of waste treatment plants

CE 1A : Environmental Engineering

Tuesday, July 25, 2017 13.30-15.00

Jakarta A Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	823	CE1A - 1	Nyoman Suwartha and Dian Rahayu Pujiastuti	Enhancing Removal Efficiency of Ammonia and Nitrate in Shrimp Farm Wastewater using Biofloc Technology and Effective Microorganisms 4 (EM4)	Universitas Indonesia, Indonesia	13.30-13.45
2	917	CE1A - 2	Christina Browning, Sholahudin Al Ayyubi and Wiratni Budhijanto	Partial Phase I Environmental Site Assessment of Piyungan Landfill and Anaerobic Fluided Bed Reactor (AFBR) Pilot Study for Leachate Treatment	Arizona State University, USA	13.45-14.00
3	82	CE1A - 3	Djoko M Hartono, Gabriel Andari Kristanto, Irma Gusniani Sofian, Ahmad Fauzan and Ghanis Mahdiana	Leachate Treatment using three Years Aged Lysimetric Bioreactor Models	Universitas Indonesia, Indonesia	14.00-14.15
4	368	CE1A - 4	Ariani Dwi Astuti, Muhammad Lindu, Ramadhani Yanidar and Maria Manda Kleiden	Effect of Plants *Vetivera zizanioides* (Akar Wangi) on Performance of Field Plant Subsurface Constructed Wetlands -Multilayer Filtration with Vertical Flow	Trisakti University, Indonesia	14.15-14.30
5	680	CE1A - 5	Adipati Gumelar, Abimanyu Alamsyah, Setyo Moersidik and Nurfitri Syadiah	Pantura Water Quality: Comparing the Pollution Distribution Model of Comal River and Garang River	School of Strategic and Global Studies	14.30-14.45
6	246	CE1A - 6	Robby Yussac Tallar, Erick Wijaya, Yohanes Reinaldo and Jian-Ping Suen	Effects of Vegetation Distribution on Experimental Micro-Drainage Channel	Maranatha Christian University, Indonesia	14.45-15.00

CE 1B : Transportation Engineering						
Tuesday, July 25, 2017 13.30-15.00 **Jakarta B Room 2nd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	813	CE1B - 1	Ellen Sophie Wulan Tangkudung and Catharina Widyadayinta	Performance Analysis of Trans-Jakarta Bus Suburban Service Move-across Greater Jakarta	Universitas Indonesia, Indonesia	13.30-13.45
2	709	CE1B - 2	Endang Widjajanti	Public Perception of Public Service Announcement (PSA) on Transportation Safety Awareness Through Television in Surabaya	National Institute of Science and Technology, Indonesia	13.45-14.00
3	248	CE1B - 3	Aleksander Purba, Fumihiko Nakamura and Dwi Herianto	Service Delivered on New Transit System from Users Viewpoint (Case Studies: TransJogja and TransMusi-Indonesia)	Lampung University, Indonesia	14.00-14.15
4	477	CE1B - 4	Martha Veraida Silaen and Jachrizal Sumabrata	Analysis and Design Of Pedestrian Facilities Along Manggarai Railway Station – Manggarai TransJakarta Shelter	Universitas Indonesia, Indonesia	14.15-14.30
5	341	CE1B - 5	ani Talitha Zafira and Muhammad Ismail Hafidz Sadjidullah	Measurement of Toll Road Service Quality (TRSQ) Using Structural Equation Model Approach	Indonesia Toll Road Authority, Indonesia	14.30-14.45

CE 2A: Geotechnical Engineering						
Tuesday, July 25, 2017 15.15-18.00 **Jakarta A Room 2nd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	86	CE2A - 1	Ferry Fatnanta and Syawal Satibi	Various Number and Gap of Helical Pile Toward Limit of Axial Carrying Capacity Helical Pile Footing Pressure on Peat Soil	Riau University, Indonesia	15.15-15.30
2	143	CE2A - 2	Sigit Pramono, Widjojo Prakoso, Astri Rahayu, Arsika Rudiyanto, Fajri Syukur, Sofian Sofian and Phil Cummins	Investigated of Characteristics Subsurface by using Parameters Vs30, HVSR and Combination of SPAC Method for Microtremor Array in Palu City and Surroundings Central Sulawesi-Indonesia	Indonesian Agency for Meteorology, Climatology and Geophysics, Indonesia	15.30-15.45
3	160	CE2A - 3	Gunawan Wibisono, Soewignjo Agus Nugroho and Khairul Umam	The Influence of Gradation and Clay Content of the Soil Shear Strength on Clayey Sand	Riau University, Indonesia	15.45-16.00

4	552	CE2A - 4	Yulinda Sari, Anis Saggaff, Wiwik Rahayu and Hanafiah Hanafiah	Characteristic and Classification of Fibrous Peat in Banyuasin Regency	Sriwijaya University, Indonesia	16.00-16.15
5	449	CE2A - 5	Fendi Yanto	A Numerical Method of the Rigid Pavement Supported by Soil Cement Column on Soft Soil	University Merdeka Madiun, Indonesia	16.15-16.30
6	188	CE2A - 6	Sigit Sutikno, Manyuk Fauzi, Ari Sandhyavitri, Rinaldi and Akbar Putra	Integrated Remote Sensing and GIS for Mapping and Classification of Peatland in Riau, Indonesia	Riau University, Indonesia	16.30-16.45
7	179	CE2A - 7	Lolom Evalita Hutabarat and Tommy Ilyas	Land Subsidence Induced by Ground Water Extraction in Urban and Coastal Areas of Jakarta City as a Sustainability Countermeasure in The Future	Universitas Indonesia, Indonesia	16.45-17.00
8	225	CE2A - 8	Yulian Firmana Arifin, Setyo Mulyo Kurniawan and Ellyn Normelani	Effectiveness of Horisontal Drains for Slope Stability of Coal Mining, Case Study of Slope Failure in Tambang Guntur, South Kalimantan	University of Lambung Mangkurat, Indonesia	17.00-17.15
9	390	CE2A - 9	Erly Bahsan, Gabriel Andari Kristanto, Sarah Pramiarsih and Syahrizal A. Latief	Geotechnical Charactheristics of Bantargebang Solid Waste Landfill using Artificial Waste Sample and Field Test	Universitas Indonesia, Indonesia	17.15-17.30
10	68	CE2A - 10	Agus Ika Putra, Muhamad Yusa and Soewignjo Agus Nugroho	Study Gradation and Moisture Content of Sand Embankment on Peat Subjected Vibration Potential liquefaction	Riau University, Indonesia	17.30-17.45
11	571	CE2A - 11	Astri Rahayu and Widjojo Prakoso	Comparing Shear-Wave Velocity from MASW with Borehole Measurement at Merapi Sediment in UMY Campus Site	Universitas Indonesia, Indonesia	17.45-18.00

CE 2B: Transportation Engineering

Tuesday, July 25, 2017 15.15-18.00

Jakarta B Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	602	CE2B - 1	Fitra Ramdhani, Husni Mubarak and Equinaldo Naldo	Rigid Pavement Road Condition Assessment With Highways Method And Pavement Condition Index (PCI) Method In Dumai City Limits Roads - Duri City at STA 173 + 000-177 + 000	Abdurrab University, Indonesia	15.15-15.30
2	754	CE2B - 2	Endang Widjajanti and Ismono Kusmaryono	Identification and Improvement of Accident Black Spots on National Road in Samarinda	National Institute of Science and Technology, Indonesia	15.30-15.45
3	117	CE2B - 3	I Nyoman Arya Thanaya, I Wayan Suweda and Gede Kossala Putra	Performance of Asphalt Concrete Wearing Course (AC-WC) Utilizing Reclaimed Asphalt Pavement from Cold Milling Bound with 80/100 Pen Asphalt	Udayana University, Indonesia	15.45-16.00
4	92	CE2B - 4	Samuel Edy Mataram Simanjuntak and Jachrizal Sumabrata	Analysis of Transjakarta Feeder Transit Service Quality : Case of Corridor 4 Pulo Gadung Dukuh Atas 2	Universitas Indonesia, Indonesia	16.00-16.15
5	791	CE2B - 5	Edy Hadian and Alvinsyah	Impact on Ridership of New Railbase Transit due to the operation of Extensive Bus Semi Rapid Transit Network (Case Study: Greater Jakarta (Jabodetabek) Public Transport Network)	Universitas Indonesia, Indonesia	16.15-16.30
6	414	CE2B - 6	Ika Kustiani and Amril Ma'Ruf Siregar	An Assessment on Sustainability of the Railway – Airport Link as an Alternative Mode of Transportation from Bandar Lampung Central Business District to Raden Inten Airport	The University of Lampung, Indonesia	16.30-16.45

CE Plenary

Wednesday, July 26, 2017 08.00-08.30

Jakarta A Room 2nd fl

Invited speaker : Dr.Bambang Trigurnarsyah, King Fahd University of Petroleum and Minerals, Saudi Arabia
Quality Management System of Saudi Contracting Companies

CE 3A : Structural and Material Engineering

Wednesday, July 26, 2017 08.30-10.00

Jakarta A Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	693	CE3A - 1	Jessica Sjah, Eric Vincens and Jean Christophe Marongiu	2D numerical modeling of Hole Erosion Test : hydrodynamic forces on the fixed pipe wall particles	Universitas Indonesia, Indonesia	08.30-08.45
2	342	CE3A - 2	Basyaruddin Aripin and Min Yuan Cheng	Issues of Shear Deformation Measurement in Experimental Studies	Kalimantan Instute of Technology, Indonesia	08.45-09.00
3	498	CE3A - 3	Irwan Katili and Imam Jauhari Maknun	Error Estimation for DKMQ24 Shell Element by Using Various Recovery Methods	Universitas Indonesia, Indonesia	09.00-09.15
4	476	CE3A - 4	Anas Puri and Rony Ardiansyah	Calculation The Edge of Slab Deflection of Modified Cakar Ayam System by Applying the Displacement Factor from Puri's Graph	Riau Islamic University, Indonesia	09.15-09.30
5	645	CE3A - 5	Heru Purnomo, Rosi Nursani, Sekar Mentari, Sjahril A. Rahim and Elly Tjahjono	Numerical evaluation of shear behavior of a metal shear key used in joining precast concrete segmental bridge girders without epoxy	Universitas Indonesia, Indonesia	09.30-09.45
6	633	CE3A - 6	Dimas Langga and Widarto Sutrisno	Comparative Analysis Layers Method of T-Beam Reinforcement	Sarjanawiyata Tamansiswa University, Indonesia	09.45-10.00

CE 3B : Construction and Project Management

Wednesday, July 26, 2017 08.30-10.00

Jakarta B Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	750	CE3B - 1	Eric Too, Tiendung Le and Wei Yee Yap	The role of governance and its impact on project scope – A Case Study	RMIT University, Australia	08.30-08.45
2	382	CE3B - 2	Basuki Anondho, Ayomi Dita Rarasati, Yusuf Latief and Khrisna Mochtar	Identification of Country Standard Measureable Indicators on Construction Project Duration Performance in Jakarta, Indonesia	Tarumanagara University, Indonesia	08.45-09.00

3	61	CE3B - 3	Ringgy Masuin, Yusuf Latief, T. Yuri Zagloel and Leni Sagita	Development of Integrated Management System between Quality Management System and Occupational Health and Safety Management System in Ministry of Public Work and Public Housing – A Conceptual Framework	Universitas Indonesia, Indonesia	09.00-09.15
4	180	CE3B - 4	Fauzan, Febrin Anas Ismail, Farizzi Adriya Shiddiq, Yogi Indrayudha and Zev Al Jauhari	Analysis of Retrofit on School Building with Shear Wall and Steel Bracing	Andalas University, Indonesia	09.15-09.30
5	910	CE3B - 5	Muhammad Haikal Syarief, Yusuf Latief and Ayomi Dita Rarasati	Development of Institutional Funding Model of Deep Discount Bond on Toll Road Projects	Universitas Indonesia, Indonesia	09.30-09.45

CE 4A : Structural and Material Engineering

Wednesday, July 26, 2017 10.15-12.00

Jakarta A Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	49	CE4A - 1	Fransisca Maria Farida, Adang Surahman, Ananta Sofwan and Rino Rakhmata Mukti	Numerical study of Geopolymer Paste as Passive Fire Protection	Bandung Institute of Technology, Indonesia	10.15-10.30
2	97	CE4A - 2	Chatarina Niken, Elly Tjahjono, Fx Supartono and Laksmi Irianti	Deformation of High Performance Concrete Plate Under Humid Tropical Weather	University of Lampung, Indonesia	10.30-10.45
3	793	CE4A - 3	I Ketut Sudarsana, Putu Deskarta and Kadek Bangkit T.S.	Capacity and Ductility Analysis of Externally Strengthened R/C Columns Using Steel Plates	Udayana University, Indonesia	10.45-11.00
4	202	CE4A - 4	Gidion Turuallo and Harun Mallisa	Using Cementitious Materials Such Fly Ash to Replace a Part of Cement in Producing High Strength Concrete in Hot Weather	Tadulako University, Indonesia	11.00-11.15
5	470	CE4A - 5	Dewi Sulistyorini and Iskandar Yasin	Ductility of Polystyrene Waste Panel	Sarjanawiyata Tamansiswa University, Indonesia	11.15-11.30

CE 4B : Fluid Mechanics and Water Resources Management

Wednesday, July 26, 2017 10.15-12.00

Jakarta B Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	204	CE4B - 1	Max Rudolf Muskananfola, Haeruddin ., Pujiono Wahyu Purnomo and Bambang Sulardiono	Erosion and Transport Rates of Sediments at Degraded Coastal Waters in Bedono Village, Sayung Demak, Central Java	Diponegoro University, Indonesia	10.15-10.30
2	195	CE4B - 2	Dwita Sutjiningsih and Yosef Prihanto	The Relationship Between Various Land Use Categories and The Imperviousness For Predicting The Impact of Excessive Land Development in Urban Area at Semarang Regency, Central Java	Universitas Indonesia, Indonesia	10.30-10.45
3	105	CE4B - 3	Ari Sandhyavitri, Sigit Sutikno, Manyuk Fauzi, Mardan Fajri and Muhammad Iqbal	Mapping of Sub-Siak Watershed Based on Remote Sensing and Simulation Its Performances Based on SWAT	Riau University, Indonesia	10.45-11.00
4	279	CE4B - 4	Toha Saleh	Analysis of Flood Emergency Response Instrument in Indonesia	Universitas Indonesia, Indonesia	11.00-11.15
5	154	CE4B - 5	Evi Anggraheni, Dwita Sutjiningsih, Airlangga Mardjono and Teuku Iskandar	Dry Dams Performance on Consecutive Rainfall During Rainy Season at Upper Ciliwung Watershed	Universitas Indonesia, Indonesia	11.15-11.30

CE 5 : Fluid Mechanics and Water Resources Management

Wednesday, July 26, 2017 14.00-15.30

Dahlia Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	497	CE5 - 1	Zainul Faizien Haza	The drag forces exerted by lahar flows on a cylindrical pier: case study of post Mount Merapi eruptions	Sarjanawiyata Tamansiswa University, Indonesia	15.15-15.30
2	134	CE5 - 2	Eva Rolia, Dwita Sutjiningsih and Herr Suryantono	Groundwater Potential Exploration in Bumi Ratu Nuban Lampung Tengah Using Geoelectric Method	Universitas Indonesia, Indonesia	15.30-15.45
3	517	CE5 - 3	Rian Mantasa Salve Prastica	Estimating Design Flood and Hec-Ras modeling Approach for Flood Analysis in Bojonegoro City	Riau University, Indonesia	15.45-16.00
4	203	CE5 - 4	Betania Lydiana, Dwinanti Rika Marthanty and Herr Soeryantono	Reliability of Smoothed Particles Hydrodynamics Method in Simulating 3D Fluid Flow towards	Universitas Indonesia, Indonesia	16.00-16.15

				Conservation of Mass and Energy		
5	432	CE5 - 5	Riyan Benny Sukmara, Ariyaningsih Ariyaningsih, Nadjadji Anwar and Edijatno Edijatno	River Flood Reduction with Multiple Dams Scenario in Karang Mumus River, Samarinda	Kalimantan Institute of Technology, Indonesia	16.15-16.30

Mech 1A : Advanced Vehicle Engineering

Tuesday, July 25, 2017 13.00-15.00

Bandung Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	696	ME1A - 1	Fuad Zainuri, Danardono Sumarsono, Muhammad Adhitya and Rolan Siregar	Devepolment a New Generation of Synchromesh Mechanism to optimization Manual Transmission's Electric Vehicle	Universitas Indonesia, Indonesia	13.00-13.15
2	404	ME1A - 2	Danardono Agus Sumarsono and Mohammad Malawat	Optimization of Impact Energy Absorber Parameters for Automobile Crush Box Using Response Surface Method	Universitas Indonesia, Indonesia	13.15-13.30
3	381	ME1A - 3	Darjat Darjat, Sulistyo Sulistyo, Aris Triwiyatno and Humaid Thalib	Designing Solid Oxide Fuel Cell (SOFC) Integrated Grid Using The Three-Phase Inverter	Diponegoro University, Indonesia	13.30-13.45
4	435	ME1A - 4	Mohammad Adhitya, Muchamad Aditya Rachmanto, Danardono Agus Sumarsono and Sudirja Sudirja	Electric Car Conversion Components Layout Arrangement and Their Effects on Center of Gravity Location	Universitas Indonesia, Indonesia	13.45-14.00
5	436	ME1A - 5	Mohammad Adhitya, Mohammad Ikhsan and Danardono Agus Sumarsono	The Vehicle Longitudinal Dynamic Simulation to Select the Optimum Gear Ratio Combination of Electric Vehicle Conversion	Universitas Indonesia, Indonesia	14.00-14.15
6	530	ME1A - 6	Sonki Prasetya, Ghany Heryana, Yudan Whulanza, Mohammad Adhitya and Danardono Agus Sumarsono	A Preliminary Case Study of A Electric Commuter Bus in Universitas Indonesia	Universitas Indonesia, Indonesia	14.15-14.30
7	499	ME1A - 7	Didik Djoko Susilo, Achmad Widodo, Toni Prahasto and Muhammad Nizam	State of Health Estimation of Lithium-ion Batteries Based on Combination of Gaussian Distribution Data and Least Square Support Vector Machine Regression	Diponegoro University, Indonesia	14.30-14.45

8	95	ME1A - 8	Harinaldi Harinaldi, Ramon Trisno and Dewi Larasati	The effect of Excitation Modes of Synthetic Jet Actuator on The Aerodynamic Drag Component of The Reversed Ahmed Body Model	Universitas Indonesia, Indonesia	14.45-15.00

Mech 1B : Naval Engineering

Tuesday, July 25, 2017 13.00-15.00

Surabaya Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	352	ME1B - 1	Dian Purnamasari, I Ketut Aria Pria Utama and I Ketut Suastika	Comparative Resistance Test Between Two Towing Tanks (A Case Study at ITS and IHL)	Agency For The Assessment and Aplication of Technology (BPPT), Indonesia	13.00-13.15
2	55	ME1B - 2	Ketut Suastika, Affan Hidayat and Soegeng Riyadi	Effects of Application of A Stern Foil on The Ship Resistance: A Case Study of Orela Crew Boat	Sepuluh Nopember Institute of Technology (ITS), Indonesia	13.15-13.30
3	625	ME1B - 3	Wiwin Sulistyawati and Prof Yanuar	An Investigation of Hull Form Pentamaran with Chine Model on the Resistance Characteristics	Universitas Indonesia, Indonesia	13.30-13.45
4	471	ME1B - 4	Muhammad Arif Budiyanto and Takeshi Shinoda	Stack Effects on the Power Consumption in the Refrigerated Container Storage Yard	Universitas Indonesia, Indonesia	13.45-14.00
5	767	ME1B - 5	Aldy Syahrihaddin, Sunaryo Sunaryo and Pradhana Imfianto	Design of Solar-Powered Electric Water Recreational and Sport Vessel	Universitas Indonesia, Indonesia	14.00-14.15
6	377	ME1B - 6	Ismail Ismail, Erlanda Pane, Damora Rhakasywi, Eko Prasetyo and Pekik Asmoro	Optimization of Open Channel Water Tunnel Design	Pancasila University, Indonesia	14.15-14.30
7	411	ME1B - 7	Fenti Suryadi, Sunaryo, Komarudin	Optimization of Container Terminal Operational Performance through Suppressing its Idle Time	Universitas Indonesia, Indonesia	14.30-14.45
8	415	ME1B - 8	Gafero Priapalla Rahim and Sunaryo	Container Ship Accident Analysis Due to Container Stacked on Deck as an Attempt to Improve Maritime Logistic System	Universitas Indonesia, Indonesia	14.45-15.00

Mech Plenary

Tuesday, July 25, 2017 15.15-15.45

Surabaya Room 2nd fl

Invited Speaker : Prof. Dr. Rein Guillermo (Imperial College London), UK

Mech 2A: Fluid Mechanics

Tuesday, July 25, 2017 15.45-18.00

Bandung Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	387	ME2A - 1	Fajri A. Rayhan, Agus S. Pamitran	Performance of Ice Slurry Generator with Mechanical Scraper Using R-22 and R-290	Universitas Indonesia, Indonesia	15.45-16.00
2	389	ME2A - 2	Sentot Novianto, Agus S. Pamitran, Raldi Koestoer, Kiyoshi Saito	Two-phase Frictional Pressure Drop of Propane with Prediction Methods of Viscosity and Density in 500 μm Diameter Tube	Universitas Indonesia, Indonesia	16.00-16.15
3	493	ME2A - 3	Yanuar Anwas, Sealtial Mau, Kurniawan Teguh Waskito, Winda Wulandari and Marcus Alberth Talahatu	The Characteristic of Calcium Carbonate (CaCO3) Nanoparticles Flow Through the Pentagon Spiral Pipe	Universitas Indonesia, Indonesia	16.15-16.30
4	84	ME2A - 4	Warjito Warjito, Ahmad Indra Siswantara, Dendy Adanta, Mustafa Kamal and Reza Dianofitra	Simple Bucket Curvature for Designing A Low Head Turgo Turbine for Pico Hydro Application	Universitas Indonesia, Indonesia	16.30-16.45
5	88	ME2A - 5	Budiarso Budiarso, Ahmad Indra Warjito, Dendy Adanta, Riandhika Pradito and Reza Dianofitra	Blade Height Optimization of Undershot Banki Pico-hydro Waterwheel by Analytical and Numerical Methods	Universitas Indonesia, Indonesia	16.45-17.00
6	56	ME2A - 6	Syaiful Syaiful, Astrid Ayutasari, Myung-Whan Bae, Maria F. Soetanto and Ahmad Indra Siswantara	Thermo-Hydrodynamics Performance Analysis of Fluid Flow through Concave Delta Winglet Vortex Generator by Numerical Simulation	Diponegoro University, Indonesia	17.00-17.15

7	99	ME2A - 7	Michael Joevian, Christopher Susanto, Sheila Tobing and Harjadi Gunawan	Numerical Analysis of Plunging and Pitching Tandem Flapping Foil Power Generation	Atma Jaya Catholic University of Indonesia, Indonesia	17.15-17.30
8	402	ME2A - 8	Budi Setyahandana, Y.B. Lukiyanto and Rines	Pipes Outlet Directions and Diameter of Double U Pipes Configuration on Centrifugal Reaction Pump	Sanata Dharma University, Indonesia	17.30-17.45
9	89	ME2A - 9	Ahmad Indra Siswantara, Warjito Warjito, Dendy Adanta, Aji Putro Prakoso and Reza Dianofitra	Comparison Between Airfoil Profiled Blade and Ordinary Blade in Cross-flow Turbine Using Numerical Simulation	Universitas Indonesia, Indonesia	17.45-18.00

Mech 2B: Fire, Combustion and Power Generation

Tuesday, July 25, 2017 15.45-18.00

Surabaya Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	526	ME2B - 1	Pither Palamba, Mohamad Lutfi Ramadhan, Engkos Achmad Kosasih and Yulianto Sulistyo Nugroho	Drying Phenomena of Indonesian Peat	Universitas Indonesia, Indonesia	15.45-16.00
2	717	ME2B - 2	Beline Alianto, Benedictus Darendra Nareshwara, Nabila Astari and Yulianto Sulistyo Nugroho	Modelling of Smoke Control in Underground Car-park Fire	Universitas Indonesia, Indonesia	16.00-16.15
3	638	ME2B - 3	Supriyadi, Nasruddin, Engkos A. Kosasih, I. A. Zulkarnain, Budhy Kurniawan	How Appropriate are Pyridinic Carbon Nitride Nanotubes for Hydrogen Storage? Molecular Thermodynamics Analysis	Trisakti University, Indonesia	16.15-16.30
4	799	ME2B - 4	Apri Wiyono, Titi Puspita, Cindy Rianti and Adi Surjosatyo	Investigation of Co-gasification Characteristics of WC Pellet and Rice Husk Mixtures in A Downdraft Fixed Bed Gasifier	Universitas Indonesia, Indonesia	16.30-16.45
5	505	ME2B - 5	Nasruddin A. Abdullah, Nandy Putra, Imansyah Ibnu Hakim and Raldi A.Koestoer	An Overview On Liquids Collection System Improvement Process For Producing Liquid Smoke	Universitas Indonesia, Indonesia	16.45-17.00
6	815	ME2B - 6	Cahyo Setyo Wibowo	The Comparison Performance Of Dual Fuel System Dimethyl Ether and Diesel Fuel With B-20 On Diesel Engine Dirrect Injection System	Research and Development Centre for Oils and Gas Technology (Lemigas), Indonesia	17.00-17.15

7	7	ME2B - 7	Bakhrul Ulum, Ervan Ambarita, Nurrohman and Yogi Sirodz Gaos	Energy And Exergy Analyses of Mount Salak Geothermal Power Plant Unit 1-2-3	Indonesia Power, Indonesia	17.15-17.30
8	792	ME2B - 8	Asyari Daryus, Ahmad Indra Siswantara, Budiarso Budiarso, Gun Gun R. Gunadi, Hariyotejo Pujowidodo and Candra Damis Widiawaty	Effect of the Air Mass Flow Rate on the Distribution of Solids in the Circulating Fluidized Bed Boiler Using CFD Simulations	Udayana University, Indonesia	17.30-17.45
9	887	ME2B - 9	Ahmad Indra Siswantara, Hariyotejo Pujowidodo, Asyari Darius and Gun Gun Ramdlan Gunadi	Mathematical Modeling – The Impact of Cooling Water Temperature Upsurge on Combined Cycle Power Plant Performance and Operation	Universitas Indonesia, Indonesia	17.45-18.00

Mech 3: Mechanical Design and Manufacture

Wednesday, July 26, 2017 08.00-10.15

Bandung Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	666	ME3 - 1	Hendri Ds Budiono	Development of the Complete Model for Calculating CNC Machining Process Complexity Based on Rotational and Non-Rotational Feature Classification	Universitas Indonesia, Indonesia	08.00-08.15
2	640	ME3 - 2	Ario Sunar Baskoro, Andreas Edyanto and Hakam Muzakki	Study on Nugget Growth in Resistance Spot Welding of Thin Aluminum A1100 Using Welding Simulation	Universitas Indonesia, Indonesia	08.15-08.30
3	648	ME3 - 3	Ario Sunar Baskoro, Hakam Muzakki, Gandjar Kiswanto and Winarto Winarto	Effects of Micro Resistance Spot Welding Parameters to Weld Joint Quality on Aluminum Thin Plate A1100	Universitas Indonesia, Indonesia	08.30-08.45
4	299	ME3 - 4	Dedison Gasni, Ismet Hari Mulyadi, Jon Affi and Andre Yulanda Miswar	Ivestigation of Abrasive Wear on Ball Bearings by Using Bio-lubricant	Andalas University, Indonesia	08.45-09.00
5	726	ME3 - 5	Danardono Agus Sumarsono, Fera Ibrahim, Haris Setiawan, Satria Putra Santoso and Gema Puspa Sari	The Delivery of DNA Vaccine: Development of Gene Gun Using Converging-diverging Nozzle to Increase Thrust Force of Mass Coated Particles	Universitas Indonesia, Indonesia	09.00-09.15

6	924	ME3 - 6	Triyono, Joko Riyono, Nur Fadhli, Daisman P.B. Aji	The Effects of Dielectric Fluid Viscousity on Chips Formation Rate and Electrode Wear Rate in Electrical Discharged Machining of SKD 61 Steel	Trisakti University, Indonesia	09.15-09.30
7	523	ME3 - 7	Dadan Ramdan	Influence of Number of Mold Cavity Vents on Wire Sweep in PBGA Encapsulation: FSI-MpCCI Simulation	Medan Area University, Indonesia	09.30-09.45
8	927	ME3 - 8	Gandjar Kiswanto, Himawan Hadi Sutrisno, Jos Istiyanto	The Compensation Method for Tool Orientation Change to Avoid Collision in 5-axis Roughing of Faceted Models	Universitas Indonesia, Indonesia	09.45-10.00
9	914	ME3 - 9	Gandjar Kiswanto, Aida Mahmudah and Dedi Priadi	Punch Force Behavior During Micro V-bending Process of the Copper Foil	Universitas Indonesia, Indonesia	10.00-10.15

Mech Plenary-Joint Session with ICSERA

Wednesday, July 26, 2017 10.15-10.45

Bandung Room 2nd fl

Invited Speaker : Jae Dong Chung (SAREK), South Korea

Mech Plenary-Joint Session with ICSERA

Wednesday, July 26, 2017 10.45-10.11.15

Bandung Room 2nd fl

Invited Speaker : Peter Simmonds (ASHRAE Distinguished Lecturer), USA

ICSERA1/Mech 4: Fluid Mechanics and Heat Transfer

Wednesday, July 26, 2017 11.15-12.00

Bandung Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	712	ME4 - 1 / ICSERA1 - 1	Stefan Mardikus and Gregorius Riyanto	Single Phase Steam Ejector Investigation: Effect Different Area Ratio Throat to Entrainment Ratio	Sanata Dharma University, Indonesia	11.15-11.30
2	898	ME4 - 2 / ICSERA1 - 2	Ting Chen, Kyungjin Bae, Dongan Cha and Ohkyung Kwon	Mass Flow Characteristics Analysis of R245FA in EEV	Korea Institute of Industrial Technology, South Korea	11.30-11.45
3	784	ME4 - 3 / ICSERA1 - 3	Nengah Suarnadwipa, I Gusti Bagus Wijaya Kusuma and Tangkesalu Aprianto	Numerical Investigation on Cooler Tank of FASSIP-01	Udayana University, Indonesia	11.45-12.00

Tuesday, July 25, 2017 13.00-13.30

Medan Room 2nd fl

Invited Speaker : Professor Yifan Chen, FIET, SMIEEE (The University of Waikato, NZ)

E Plenary

Tuesday, July 25, 2017 13.30-14:00

Medan Room 2nd fl (Moderator : Dr. Muhammad Suryanegara)

Invited Speaker : Professor Kalamullah Ramli (Universitas Indonesia)

E 1 : Communication System and Signal Processing 1

Tuesday, July 25, 2017 13.30-15.00

Medan Room 2nd fl (Chair Session: Prof. Hana Baili)

No	Paper #	ID	Author	Title	Affiliation	Time
1	307	E1 - 1	Hana Baili	Propagation of Chaos in Power Control Games for Energy-Efficient Wireless Networks	Centrale Supelec, France	14.00-14.15
2	332	E1 - 2	Chih-Wen Lu and Yen-Chung Huang	A 10-Bit TFT-LCD Column Driver IC with an RDAC-Embedded Op-amp	National Tsing Hua University, Taiwan	14.15-14.30
3	622	E1 - 3	Rizal Munadi	An Evaluation of DNS Server Health of State-Owned Universities in Sumatera Island	Syiah Kuala University, Indonesia	14.30-14.45
4	297	E1 - 4	Dini Fronitasari and Dadang Gunawan	Palm Vein Recognition by Using Modified Local Binary Pattern for Extraction Feature	Universitas Indonesia, Indonesia	14.45-15.00

E 2 : Computer Engineering 1

Tuesday, July 25, 2017 15.15-18.00

Medan Room 2nd fl (Session Chair: Prof. Poki Chen (NTUST) / Dr. Mat Syai'in)

No	Paper #	ID	Author	Title	Affiliation	Time
1	890	E2 - 1	Intan Budiastuti, Supeno Mardi Susiki Nugroho and Mochamad Hariadi	Predicting Daily Consumer Price Index Using Support Vector Regression Method	Sepuluh Nopember Institute of Technology (ITS), Indonesia	15.15-15.30
2	13	E2 - 2	Abdul Aziz Al Rasyid, Dion Ogi and Steven Yohanes	Implementation of Timestamping Linking Protocol in a Web Based Timestamping Application	National Crypto Institute, Indonesia	15.30-15.45
3	85	E2 - 3	I Putu Deny Arthawan Sugih Prabowo, Eko Nugroho and Rudy Hartanto	Analysis on The Green IT Applications Usage for The Firm's Competitive Advantage Strategy	Gadjah Mada University, Indonesia	15.45-16.00
4	122	E2 - 4	Gladly Caren Rorimpandey and Jan Pieter Zwart	Performance Comparison Between Four Data Models Used in Data Warehousing	Manado State University, Indonesia	16.00-16.15
5	479	E2 - 5	Moch Syamsul Arifin Sidik, Mat Syai'In, Sryang Tera Sarena, Lilik Subiyanto, Rachmad Tri Soelistijono, Joko Endrasmono, Annas Singgih Setyoko, Aang Wahidin and Adi Soeprijanto	Vending Machine for Office Stationery Transactions Using TCASH	Shipbuilding Institute of Polytechnic Surabaya, Indonesia	16.15-16.30

6	715	E2 - 6	Putu Manik Prihatini, I Ketut Gede Darma Putra, Ida Ayu Dwi Giriantari and Made Sudarma	Comparison of Gibbs Sampling and Mean Variational Inference for Latent Dirichlet Allocation on Indonesian Documents	Udayana University, Indonesia	16.30-16.45
7	873	E2 - 7	Asri Yulianti, Surya Sumpeno and Mauridhi Hery Purnomo	Majority Vote Technique Based On Multi Rough Set for Multi Attributes Decision-Making System	Sepuluh Nopember Institute of Technology (ITS), Indonesia	16.45-17.00
8	338	E2 - 8	Ding-Bing Lin, Chung-Ke Yu, Chih-Kang Lai and Ko-Ying Huang	Improved Structure of Ground Terminals for Crosstalk Reduction in SAS-3 Storage Connector Design	National Taiwan University of Science and Technology, Taiwan	17.00-17.15
9	323	E2 - 9	Poki Chen and Yi-Su Chung	High Accuracy FPGA Vernier Time-to-Digital Converter Based on PLL Delay Matrix	National Taiwan University of Science and Technology, Taiwan	17.15-17.30

E 3A : Electronic Devices and Semiconductor 1

Wednesday, July 26, 2017 08.00-10.00

Medan Room 2nd fl Session Chair: Dr. Arief Udhiarto/ Dr. Anak Agung Ngurah Made Narottama)

No	Paper #	ID	Author	Title	Affiliation	Time
1	44	E3A - 1	Masahiro Hori, Tokinobu Watanabe and Yukinori Ono	Real-rime Monitoring of Charge-pumping Process for SiO2/Si Interface Analysis	Shizuoka University, Japan	08.00-08.15
2	182	E3A - 2	Anak Agung Ngurah Made Narottama and Anak Agung Ngurah Gde Sapteka	Effect of Ge Mole Fraction on Current, Voltage and Electric Field Characteristics of High Doping Nanoscale Si1-xGex/Si p-n Diode.	Politeknik Negeri Bali, Indonesia	08.15-08.30
3	93	E3A - 3	Saya Kobayashi and Jun Kondoh	Measurement of Particles in Oil Using Shear Horizontal Surface Acoustic Wave Sensor	Shizuoka University, Japan	08.30-08.45
4	355	E3A - 4	Arief Udhiarto, Bobi Khoerun, Layina Maula Haryanto and Djoko Hartanto	Effect of Anode and Cathode Workfunction on the Operating Voltage and Luminance of a Single Emissive Layer Organic Light Emitting Diode	Universitas Indonesia	08.45-09.00

5	148	E3A - 5	Masaaki Nagatsu, Masahiro Kimpara and Tomy Abuzairi	Surface Functionalization of Fluorocarbon Polymers by Atmospheric Pressure Plasma Jet with Ion Bombardment Effect	Shizuoka University, Japan	09.00-09.15
6	484	E3A - 6	Cahyaning Nur Karimah, Retno Wigajatri Purnamaningsih, Tomy Abuzairi and Nji Raden Poespawati	Bifacial Heterojunction Intrinsic Thin Layer Solar Cells As a BioFET Supply	Universitas Indonesia, Indonesia	09.15-09.30
7	676	E3A - 7	Adnan Afiff, Arup Samanta, Tarik Hasan, Arief Udhiarto, Harry Sudibyo, Djoko Hartanto, Michiharu Tabe and Daniel Moraru	A Statistical Study on the Formation of A-Few-Dopant Quantum Dots in Highly-Doped Si Nanowire Transistors	Shizuoka University, Japan	09.30-09.45
8	378	E3A-8	Hidenori Mimura, Tomoaki Masuzawa and Yoichiro Neo	Microfield Emitters; Characteristics and Applications	Shizuoka University, Japan	09.45-10.00

E 3B : Antennas and Microwave Devices

Wednesday, July 26, 2017 08.00-10.00

Surabaya Room 2nd fl (Session Chair: Dr. Achmad Munir/ Dr. Fitri Yuli Zulkifli)

No	Paper #	ID	Author	Title	Affiliation	Time
1	763	E3B - 1	Achmad Munir, Habibur Muhaimin, Mohammad Sigit Arifianto, C Chairunnisa, Mohammad Ridwan Effendi and Andriyan Bayu Suksmono	Wideband BPF Composed of Planar Inverted-F Shaped for S-Band Frequency Application	Bandung Institute of Technology (ITB), Indonesia	08.00-08.15
2	588	E3B - 2	Farohaji Kurniawan, Josaphat Tetuko Sri Sumantyo, Mujtahid Mujtahid and Achmad Munir	Effect of Shape Truncation Against Axial Ratio of Left-Handed Circularly Polarized X-Band Antenna	Chiba University, Japan	08.15-08.30
3	259	E3B - 3	Antrisha Daneraici Setiawan and Achmad Munir	Incorporation of High Permittivity Circular Dielectric Resonator for Enhancing Resonant Frequency of Microstrip Antenna	General Achmad Yani University, Indonesia	08.30-08.45

4	294	E3B - 4	Syah Alam, I Gusti Nyoman Wibisana and Indra Surjati	Miniaturization of Array Microstrip Antenna Using Peripheral Slits for Wireless Fidelity Communication	University of 17 August 1945 Jakarta, Indonesia	08.45-09.00
5	360	E3B - 5	Karlisa Priandana, Benyamin Kusumoputro and Eko Tjipto Rahardjo	The Design of ISM-Band Radar Antenna for Small Boat's Trajectory Tracking	Universitas Indonesia, Indonesia	09.00-09.15
6	532	E3B - 6	Dian Widi Astuti, Arif Jubaidillah and Mudrik Alaydrus	Substrate Integrated Waveguide Bandpass Filter for VSAT Downlink	Mercu Buana University, Indonesia	09.15-09.30
7	534	E3B - 7	Dian Widi Astuti, Ahmad Firdausi and Mudrik Alaydrus	Multiband Double Layered Microstrip Antenna Fed by Proximity Coupling	Mercu Buana University, Indonesia	09.30-09.45
8	249	E3B - 8	Yulianto La Elo, Fitri Yuli Zulkifli and Eko Tjipto Rahardjo	Design of Wideband Microstrip Antenna With Parasitic Elemen For 4G/LTE Application	Universitas Indonesia, Indonesia	09.45-10.00

E 4A : Electronic Devices and Semiconductor 2

Wednesday, July 26, 2017 10.15-10.00

Medan Room 2nd fl (Session Chair: Dr. Purnomo Sidi Priambodo/ Prof. Hiroshi Inokawa)

No	Paper #	ID	Author	Title	Affiliation	Time
1	73	E4A - 1	Lin Prasetyani and Purnomo Sidi Priambodo	450nm Laser Diode Beam Shaping for Repairing Burning Footprint in Engraving Process	Universitas Indonesia, Indonesia	10.15-10.30
2	189	E4A - 2	Mohammad Iwan Wahyuddin, Purnomo Sidi Priambodo and Harry Sudibyo	High Frequency Current Load Effects on Battery Internal Resistance	Universitas Indonesia, Indonesia	10.30-10.45
3	218	E4A - 3	Hiroshi Inokawa, Kou Akiba and Hiroaki Satoh	Thermal Conductance and Heat Capacity Measurement Utilizing Suspended-Wire Resistor	Shizuoka University, Japan	10.45-11.00
4	273	E4A - 4	Tomy Abuzairi, Nji Raden Poespawati, Retno Wigajatri Purnamaningsih and Dicky Apriady	Preliminary Study of Plasma-treated Water for Germination Stimulation of Agricultural Seeds	Universitas Indonesia, Indonesia	11.00-11.15
5	316	E4A - 5	Natalita Maulani Nursam, Jojo Hidayat, Lia Muliani Pranoto and Suwastika Wijayanti	Electrical Properties of Dye-sensitized Solar Module with Integrated Parallel Connections	Indonesian Institute of Science (LIPI), Indonesia	11.15-11.30

6	904	E4A - 6	Sakib Mohammad, Md. Noumil Tousif, A. A. Ferdous, Md. Ashraful Hoque and Mohammad Wahidur Rahman	Numerical Simulation of CZTS Solar Cell with In2S3 Buffer Layer	Islamic University of Techology, Bangladesh	11.30-11.45
7	918	E4A - 7	Syam Erast Prayoga, Retno Wigajatri Purnamaningsih, Tomy Abuzairi, and Nji Raden Poespawati	Crystalline Silicon Solar Cell Design with AlxGa1-xAs As Heterojunction with Compound Thin Layer for Biosensor Application	Universitas Indonesia, Indonesia	11.45-12.00
8	521	E4A - 8	Kazuhiko Hara, Kensuke Fukasawa, Tsuyoshi Nagase, Yuichiro Masuda, Tetsuya Kouno and Hiroko Kominami	Source Combination of Gallium Vapor and NH3 Gas for Chemical Vapor Deposition of GaN Films	Shizuoka University, Japan	12.00-12.15

E 4B : Medical Applications and Imaging System

Wednesday, July 26, 2017 10.15-10.00

Surabaya Room 2nd fl (Session Chair: Dr. Prima Dewi Purnamasari / Dr. Engelin Shintadewi Julian)

No	Paper #	ID	Author	Title	Affiliation	Time
1	119	E4B - 1	Ernia Susana and Hendrana Tjahjadi	Handheld Pulse Oximeter Using Raspberry Pi	Health Polytechnic of Jakarta II, Indonesia	10.15-10.30
2	138	E4B - 2	Engelin Shintadewi Julian, Kiki Prawiroredjo and Gunawan Tjahjadi	The Model of Near Infrared Sensor Output Voltage As a Function of Glucose Concentration in Solution	Trisakti University, Indonesia	10.30-10.45
3	295	E4B - 3	Faisal Narpati and Basari Basari	Design of Ultrawideband Applicator for Microwave Ablation Aimed at Thermal Therapy in Liver Cancer	Universitas Indonesia, Indonesia	10.45-11.00
4	399	E4B - 4	Prima Dewi Purnamasari, Anak Agung Putri Ratna and Benyamin Kusumoputro	Relative Wavelet Bispectrum Feature for Alcoholic EEG Signal Classification Using Artificial Neural Network	Universitas Indonesia, Indonesia	11.00-11.15
5	434	E4B - 5	Bayu Azmi, Wibisono - and Adhi Harmoko Saputro	Portable Gamma Ray Tomography System for Investigation of Geothermal Power Plant Pipe Scaling	National Nuclear Energy Agency (BATAN), Indonesia	11.15-11.30

6	541	E4B - 6	Brahmastro Kresnaraman, Yasutomo Kawanishi, Daisuke Deguchi, Tomokazu Takahashi, Yoshito Mekada, Ichiro Ide and Hiroshi Murase	Headgear Recognition by Decomposing Human Images in the Thermal Infrared Spectrum	Nagoya University, Japan	11.30-11.45
7	599	E4B - 7	Erni Yudaningtyas, Djoko Santjojo, Waru Djuriatno, Indrazno Siradjuddin and Muhammad Rony Hidayatullah	Identification of Pulse Frequency Spectrum of Chronic Kidney Disease Patients Measured at TCM Points Using FFT Processing	Brawijaya University, Indonesia	11.45-12.00
8	64	E4B - 8	Hendrana Tjahjadi and Kalamullah Ramli	Review of Photoplethysmography Based Noninvasive Continuous Blood Pressure Methods	Universitas Indonesia, Indonesia	12.00-12.15

E 4C : Control Engineering System 1

Wednesday, July 26, 2017 10.15-10.00

Ballroom Mangupura 1st fl (Session Chair: Dr. Feri Yusivar / Dr. Wahidin Wahab)

No	Paper #	ID	Author	Title	Affiliation	Time
1	150	E4C – 1	Suwandi Dwi Sahputro, Fahmi Fadilah, Nanda Avianto Wicaksono and Feri Yusivar	Design and Implementation of Adaptive PID Controller for Speed Control of DC Motor	Universitas Indonesia, Indonesia	10.15-10.30
2	191	E4C – 2	Bernadeta Wuri Harini, Aries Subiantoro and Feri Yusivar	Study of Speed Sensorless Permanent Magnet Synchronous Motor (PMSM) Control Problem due to Braking During Steady State Condition	Universitas Indonesia, Indonesia	10.30-10.45
3	288	E4C – 3	Misbahul Fajri and Kalamullah Ramli	PID Structure Based on Active Queue Management: A Review	Universitas Indonesia, Indonesia	10.45-11.00
4	397	E4C – 4	Jemie Muliadi, Rizki Langit and Benyamin Kusumoputro	Estimating the UAV Moments of Inertia Directly from Its Flight Data	Universitas Indonesia, Indonesia	11.00-11.15
5	453	E4C – 5	Indrazno Siradjuddin, Zakiyah Amalia, Budhy Setiawan, Rendi Pambudi Wicaksono and Erni Yudaningtyas	Stabilising a Cart Inverted Pendulum System Using Pole Placement Control Method	The State Polytechnic of Malang, Indonesia	11.15-11.30

6	624	E4C – 6	Wahidin Wahab and Muhammad Ramadiansyah	Modeling, Simulation and Control of a high Precision Loading-Unloading Robot for CNC Milling Machine	Universitas Indonesia, Indonesia	11.30-11.45
7	722	E4C – 7	Yohanes Berchman Adyapaka Apatya, Feri Yusivar and Aries Subiantoro	Design and Prototyping of 3-Phase BLDC Motor	Universitas Indonesia, Indonesia	11.45-12.00
8	883	E4C – 8	Muhammad Akil, Ingrid Nurtanio and Rhiza Samsoe'oed Sadjad	A DC Motor Speed Control Using LPC-ANFIS Speech Recognition System	Bosowa Polytechnic, Indonesia	12.00-12.15

E 4D : Computer Engineering 2

Wednesday, July 26, 2017 10.15-10.00

Hisbiscus Room 1st fl (Session Chair: Dr. Prihandoko / Dr. Misfa Susanto)

No	Paper #	ID	Author	Title	Affiliation	Time
1	21	E4D – 1	Prihandoko Prihandoko, Bertalya Bertalya and Muhammad Iqbal Ramadhan	An Analysis of Natural Disaster Data by Using K-Means and K-Medoids Algorithm of Data Mining Techniques	Gunadarma University, Indonesia	10.15-10.30
2	26	E4D – 2	Danila Machmud and Dion Ogi	The Implementation of Wash, Rinse, and Spin Technique in Accelerometer's Data Processing on Android Smartphone to Generate Stream Keys	National Crypto Institute, Indonesia	10.30-10.45
3	132	E4D – 3	Mohamad Ali Sadikin, Dea Saka Kurnia Putra and Susila Windarta	S-Mbank: Secure Mobile Banking Authentication Scheme Using Signcryption, Pair Based Text Authentication, and Contactless Smartcard	National Crypto Institute	10.45-11.00
4	386	E4D – 4	Anak Agung Putri Ratna, Randy Sanjaya, Tomi Wirianata and Prima Dewi Purnamasari	Word Level Auto-correction for Latent Semantic Analysis Based Essay Grading System	Universitas Indonesia, Indonesia	11.00-11.15
5	430	E4D – 5	Rini Wisnu Wardhani, Dion Ogi, Mohamad Syahral and Dedy	Fast Implementation of AES on Cortex-M3 for Security Information Devices	National Crypto Institute, Indonesia	11.15-11.30

			Septono Catur Putranto			
6	370	E4D – 6	Misfa Susanto, Risdawati Hutabarat, Yetti Yuniati and Syaiful Alam	Interference Management Using Power Control for Uplink Transmission in Femtocell-Macrocell Cellular Communication Network	University of Lampung, Indonesia	11.30-11.45
7	856	E4D – 7	Astriany Noer, Zulfajri B. Hasanuddin and Dewiani Djamaluddin	Implementation of RFID Based Raspberry Pi for User Authentication and Offline Intelligent Payment System	Hasanuddin University, Indonesia	11.45-12.00
8	881	E4D – 8	Indah Survyana Wahyudi, Mochamad Hariadi and Achmad Affandi	Recommender Engine Using Cosine Similarity Base On Alternating Least Square -Weight Regularization	Sepuluh Nopember Institute of Technology (ITS), Indonesia	12.00-12.15

E 5A : Communication System and Signal Processing 3

Wednesday, July 26, 2017 14.00-15.30

Medan Room 2nd fl (Session Chair: Dr. Ajib Setyo Arifin / Dr. Helmy Fitriawan)

No	Paper #	ID	Author	Title	Affiliation	Time
1	35	E5A - 1	Carissa Mega Yulianingrum and Susila Windarta	Coverage Test on LBlock-DM, LBlock-MMO and LBlock-MP	National Crypto Agency (Lemsaneg), Indonesia	14.00-14.15
2	33	E5A - 2	Sofu Risqi and Susila Windarta	Collision Test and Fixed Point Attack on PGV-5 SIMON-32 and PGV-5 SIMECK-32	National Crypto Agency (Lemsaneg), Indonesia	14.15-14.30
3	876	E5A - 3	Muhammad Fathur Rahman N, Salama Manjang and Zahir Zainuddin	Water Level Measurement Using Ultrasonic Pipe in Open Channel	Hasanuddin University, Indonesia	14.30-14.45
4	694	E5A - 4	Diah Kusumawati and Muhammad Suryanegara	IoT Spectrum Requirement for Smart Transportation	Universitas Indonesia, Indonesia	14.45-15.00
5	388	E5A - 5	Helmy Fitriawan, Ahmad Surya Arifin, Danny Mausa, Misfa Susanto and Agus Trisanto	ZigBee Based Wireless Sensor Network and Performance Analysis in Various Environments	University of Lampung, Indonesia	15.00-15.15
6	907	E5A - 6	Ajib Setyo Arifin, Andrianus Pradipta and Dadang Gunawan	Modelling and Analysis E-SIM in Indonesia	Universitas Indonesia, Indonesia	15.15-15.30

E 5B : Power Engineering System 1

Wednesday, July 26, 2017 14.00-15.30

Surabaya Room 2nd fl (Session Chair: Prof. Woei-Luen Chen / Dr. Chairul Hudaya)

No	Paper #	ID	Author	Title	Affiliation	Time
1	766	E5B - 1	Woei-Luen Chen, Chun-Yuan Chen, I-Chyn Wey and Yu-Ping Chou	Design and Control of a 10kW Three-Phase Grid-tied Back to Back Inverter	University of Taipei, Taiwan	14.00-14.15
2	285	E5B - 2	A K M Kamrul Hasan, Md Al-Amin Sarker, Shovajit Saha and Silvia Naznin Nupur	Load Frequency Control with Economic Dispatch in Power System	Southeast University, Bangladesh	14.15-14.30
3	308	E5B - 3	Muhammad Levy Aninditio and Amien Rahardjo	Lighting Replacement Analysis at Classrooms of Engineering Center, Faculty of Engineering, Universitas Indonesia	Universitas Indonesia, Indonesia	14.30-14.45
4	547	E5B - 4	Agus Indarto, Iwa Garniwa, Rudy Setiabudy and Chairul Hudaya	Total Cost of Ownership Analysis of 60 MVA 150/120 kV Power Transformer	Universitas Indonesia, Indonesia	14.45-15.00
5	593	E5B - 5	Yosi Ohira and Chairul Hudaya	Utilization of Idle Power Plant for Own Use and Excess Power in an Oil-and-Gas Company	Universitas Indonesia, Indonesia	15.00-15.15
6	687	E5B - 6	Widodo Pudji Muljanto and Rinaldy Dalimi	Secondary Voltage Control Of Single Phase Induction Generator Operated In Small Scale Picohydro Power Plant At Off-Grid Area.	Universitas Indonesia, Indonesia	15.15-15.30

E 5C : Control Engineering System 2

Wednesday, July 26, 2017 14.00-15.30

Jakarta A Room 2nd fl (Session Chair: Dr. Muhammad Rif'An / Dr. Mat Syai'in)

No	Paper #	ID	Author	Title	Affiliation	Time
1	413	E5C - 1	Bhakti Yudho Suprapto, Wahidin Wahab, Benyamin Kusumoputro and Amsa Mustaqim	Modified Elman Recurrent Neural Network for Attitude Control of Heavy-lift Hexacopter	Universitas Indonesia, Indonesia	14.00-14.15
2	465	E5C - 2	Muhammad Rif'An, Feri Yusivar and Benyamin Kusumoputro	Adaptive PID Controller Based on Additional Error of an Inversed-Control Signal for Improved Performance of Brushless DC Motor	Universitas Indonesia, Indonesia	14.15-14.30
3	466	E5C - 3	Rosalia H Subrata, Julian Leonard Hardenberg and Ferrianto Gozali	The Use of PID Controller to Get the Stable Floating Condition of the Objects in Magnetic Levitation System	Trisakti University, Indonesia	14.30-14.45

4	508	E5C - 4	Abdul Halim and Muhammad Sulaiman Nur Ubay	Performance Simulation of PID Based ADCS for Earth Observation Micro Satellite	Universitas Indonesia, Indonesia	14.45-15.00
5	555	E5C - 5	Dimas Andy Kurniawan, Mat Syai'In, Syamsiar Kautsar, Lilik Subiyanto, Joko Endrasmono, Rachmad Tri Soelistijono, Annas Singgih Setyoko, Aang Wahidin, Adi Soeprijanto and M. Khoirul Hasin	Hand Typist Robot Modelling for Quadriplegic Person Using Extreme Learning Machine	Shipbuilding Institute of Polytechnic Surabaya, Indonesia	15.00-15.15
6	600	E5C - 6	Yusuf Lestanto, Aries Subiantoro and Feri Yusivar	Two-stage Least Square Method for Model Identification of Vehicle Motion	Universitas Indonesia, Indonesia	15.15-15.30

E 6A : Tera/Optical Devices and Electrical System

Wednesday, July 26, 2017 15.45-18.00

Medan Room 2nd fl (Dr. Teti Zubaidah / Dr. Catur Apriono)

No	Paper #	ID	Author	Title	Affiliation	Time
1	94	E6A - 1	Dewi Anggraeni and Purnomo Sidi Priambodo	Open-loop Fiber Optic Gyroscope Model Based on Angle-random Walk Effect	Universitas Indonesia, Indonesia	15.45-16.00
2	410	E6A - 2	Retno Wigajatri Purnamaningsih, Poespawati Poespawati, Sasono Rahardjo, Maratul Hamidah, Elhadj Dogheche and Tomy Abuzairi	The Effect of Waveguide Parameters on GaN Based S-bend Y-junction Optical Power Divider	Universitas Indonesia, Indonesia	16.00-16.15
3	564	E6A - 3	Maratul Hamidah, Sasono Rahardjo, Retno Wigajatri Purnamaningsih, Poespawati and Purnomo Sidi Priambodo	Comparison of Coupling Coefficient (κ) Variation Effects on Double Couplers Structured Single Ring Resonator with Single and Double Beams Injection	Agency for The Assessment and Application of Technology (BPPT), Indonesia	16.15-16.30
4	570	E6A - 4	Yus Natali, Purnomo Sidi Priambodo and Eko Tjipto Rahardjo	Study on Electro-Optic Modulator Based Distributed Antenna System Over Wavelength Division Multiplexing Passive Optical Network System	Universitas Indonesia, Indonesia	16.30-16.45
5	613	E6A - 5	Catur Apriono, Nofrizal ., Mochamad Dandy Firmansyah, Fitri Yuli Zulkifli and Eko Tjipto Rahardjo	Near-field to Far-field Transformation of Cylindrical Scanning Antenna Measurement Using Two Dimension Fast-Fourier Transform	Universitas Indonesia, Indonesia	16.45-17.00
6	733	E6A - 6	Teguh Wahyudi, Catur Apriono, Fitri Yuli Zulkifli and Eko Tjipto Rahardjo	Broadband Planar Bow-tie Antenna on High Resistivity Silicon Substrate for Terahertz Application	Universitas Indonesia, Indonesia	17.00-17.15
7	852	E6A - 7	Teti Zubaidah, Bulkis Kanata, Paniran Paniran and Ahmad Yani	Static and Dynamic Magnetic Fields Scattering on a Mini Magneto-static Flux Manipulator for Wireless Power Transfer	Mataram University, Indonesia	17.15-17.30
8	227	E6A - 8	Teti Zubaidah, Bulkis Kanata and Made Sutha Yadnya	Engaging Community in Developing Electrical Wind Power in Rembitan Village, Central Lombok	Mataram University, Indonesia	17.30-17.45

E 6B : Power Engineering System 2

Wednesday, July 26, 2017 15.45-18.00

Surabaya Room 2nd fl (Dr. Tomy Abuzairi / Dr. Chairul Hudaya)

No	Paper #	ID	Author	Title	Affiliation	Time
1	57	E6B - 1	Heri Suyanto and Rina Irawati	Study Trendsand Challengesofthe Developmentof Microgrids	PLN Technical College, Indonesia	15.45-16.00
2	29	E6B - 2	Retno Aita Diantari and Isworo Pujotomo	Compressed Natural Gas (CNG) Technology for Fuel Power Plants	PLN Technical College, Indonesia	16.00-16.15
3	468	E6B - 3	Fitriyanti Mayasari and Rinaldy Dalimi	Dynamic Modeling of CPO Supply to Fulfill Biodiesel Demand in Indonesia	Universitas Indonesia, Indonesia	16.15-16.30
4	559	E6B - 4	Adinda Franky Nelwan, Chairul Hudaya and Rinaldy Dalimi	Concept Development for Quantification of Integrated Energy Security	Universitas Indonesia, Indonesia	16.30-16.45
5	565	E6B - 5	Diah Permata, Henry B.H. Sitorus and Yoga Putra Pratama	A Study on Overvoltage Protection Using Various Surge Protective Devices in Telecommunication Building	University of Lampung, Indonesia	16.45-17.00
6	716	E6B - 6	Wahyuni Martiningsih, Heri Haryanto, Inawati Inawati and M. Iman Santoso	Power System Stability Improvement Using Dynamic Gain Control AVR PSS	Universitas Sultan Ageng Tirtayasa, Indonesia	17.00-17.15
7	741	E6B - 7	Nur Fitryah, Syamsir Abduh and Ishak Kasim	Grounding System Design Optimalization on 275 KV Betung Substation Based IEEE Standard 80-2000	Trisakti University, Indonesia	17.15-17.30
8	911	E6B - 8	Herlina Herlina, Rudy Setiabudy and Amien Rahardjo	Influence of Permanent Magnet and Slot Opening Width to Cogging Torque Reduction in PMSG Using Anti-Notch Method	Universitas Indonesia, Indonesia	17.30-17.45
9	129	E6B - 9	Ratnasari Nur Rohmah and Nurokhim	Simulation of I-131 Dispersion Around KNS (Kawasan Nuklir Serpong) Using Gaussian Plume Model	Muhammadiyah University of Surakarta, Indonesia	17.45-18.00

E 6C : Electrical System and Solar Power System						
Wednesday, July 26, 2017 15.45-18.00						
Dahlia Room 1st fl (Dr. Wahidin Wahab / Dr. Gunawan Wibisono)						
No	Paper #	ID	Author	Title	Affiliation	Time
1	604	E6C - 1	Wahidin Wahab	Design and Simulaton of an Output Voltage Stabilization and Control for Solar Power (PV) Application Using Fuzzy Logic Controller	Universitas Indonesia, Indonesia	15.45-16.00
2	349	E6C - 2	Euis Suryati and Gunawan Wibisono	Machine to Machine Application As Kwh Meter Controlling	Universitas Indonesia, Indonesia	16.00-16.15
3	276	E6C - 3	Jazuli Fadil, Soedibyo, Mochamad Ashari	Comparison Performance of Vertical Axis and Horizontal Axis Wind Turbines to Get Optimum Power Output	Sepuluh Nopember Institute of Technology (ITS), Indonesia	16.15-16.30
4	300	E6C - 4	Antonius Rajagukguk, Ciptian Weried Priananda, Dedet Candra Riawan, Soedibyo Soedibyo and Mochamad Ashari	New Method Derivative Area Cluster for Optimization of PV Farm Under Dynamic Shading Effect	Sepuluh Nopember Institute of Technology (ITS), Indonesia	16.30-16.45
5	63	E6C - 5	Iswan Iswan and Iwa Garniwa	Principal Component Analysis and Cluster Analysis for Development of Electrical System	Universitas Indonesia, Indonesia	16.45-17.00
6	241	E6C - 6	Ciptian Weried Priananda, Antonius Rajagukguk, Dedet Candra Riawan, Soedibyo Soedibyo and Mochamad Ashari	New Approach of Maximum Power Point Tracking for Static Miniature Photovoltaic Farm Under Partially Shaded Condition Based on New Cluster Topology	Sepuluh Nopember Institute of Technology (ITS), Indonesia	17.00-17.15
7	808	E6C - 7	Wisnu Ananda	External Quantum Efficiency (EQE) Measurement of Solar Cells	Center for Material and Technical Product, Ministry of Inductry, Indonesia	17.15-17.30

E 6D : Communication System and Signal Processing 2

Wednesday, July 26, 2017 15.45-18.00

Bougenville Room 2nd fl (Session Chair: Dr. Muhammad Suryanegara / Dr. Misfa Susanto)

No	Paper #	ID	Author	Title	Affiliation	Time
1	506	E6D - 1	Gregorius Ivan Baskara and Muhammad Suryanegara	Study of Filter-Bank Multi Carrier (FBMC) Utilizing Mirabbasi-Martin Filter for 5G System	Universitas Indonesia, Indonesia	15.45-16.00
2	758/888	E6D - 2	Abdul Hafid Paronda and Muhamad Asvial	User's Velocity-based Uplink Power Control in 5G Femtocell Networks	Universitas Indonesia, Indonesia	16.00-16.15
3	296	E6D - 3	Andreyanto Pratama, Taufik Hidayatullah and Dedy Septono Catur Putranto	Efficient Implementation of Hash Sequence Authentication Based on RFID	National Crypto Institute, Indonesia	16.15-16.30
4	312	E6D - 4	Sukra Bambang Wahyu Tri Hatmaja, Saptadi Nugroho and Iwan Setyawan	Stationary Obstacle Detection Using Pyramidal Lucas Kanade Optical Flow	Satya Wacana Christian University, Indonesia	16.30-16.45
5	371	E6D - 5	Dika Fauzia, Melvi and Syaiful Alam	Downlink Power Control for Interference Management in Femtocell-Macrocell Cellular Communication Network	University of Lampung, Indonesia	16.45-17.00
6	376	E6D - 6	Lessy Sutiyono Aji, Gunawan Dadang and Gunawan Wibisono	The Adoption of TV White Space Technology As a Rural Telecommunication Solution in Indonesia	Universitas Indonesia, Indonesia	17.00-17.15
7	385	E6D - 7	Dani Indra Widjanarko and Dadang Gunawan	A Hybrid C/Ku-band High Throughput Satellite Systems As an Optimal Design for Indonesia	Universitas Indonesia, Indonesia	17.15-17.30
8	882	E6D - 8	Muhammad Suryanegara and Insan Laksana Pribadi	Regulatory Recommendations for IoT Smart-health Care Services by Using Privacy Impact Assessment (PIA)	Universitas Indonesia, Indonesia	17.30-17.45
9	690	E6D - 9	Erfan Rohadi, Aida Sartimbul and Imam Fahrurrozi	Identification and Characterization of Mangrove Forest in View of Sustainability Conservation and Management: Mangrove Identification of Southern Coast Malang Region, East Java, Indonesia	The State Polytechnic of Malang, Indonesia	17.45-18.00

ICSERA Plenary
Joint Session with International Symposium on Mechanical and Maritime Engineering

Wednesday, July 26, 2017 10.15-10.45

Bandung Room 2nd fl

Invited Speaker : Jae Dong Chung (SAREK), South Korea

ICSERA Plenary
Joint Session with International Symposium on Mechanical and Maritime Engineering

Wednesday, July 26, 2017 10.45-10.11.15

Bandung Room 2nd fl

Invited Speaker : Peter Simmonds (ASHRAE Distinguished Lecturer), USA

ICSERA1/Mech 4: Fluid Mechanics and Heat Transfer

Wednesday, July 26, 2017 11.15-12.00

Bandung Room 2nd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	712	ME4 - 1 / ICSERA1 - 1	Stefan Mardikus and Gregorius Riyanto	Single Phase Steam Ejector Investigation: Effect Different Area Ratio Throat to Entrainment Ratio	Sanata Dharma University, Indonesia	11.15-11.30
2	898	ME4 - 2 / ICSERA1 - 2	Ting Chen, Kyungjin Bae, Dongan Cha and Ohkyung Kwon	Mass Flow Characteristics Analysis of R245FA in EEV	Korea Institute of Industrial Technology, South Korea	11.30-11.45
3	784	ME4 - 3 / ICSERA1 - 3	Nengah Suarnadwipa, I Gusti Bagus Wijaya Kusuma and Tangkesalu Aprianto	Numerical Investigation on Cooler Tank of FASSIP-01	Universitas Indonesia, Indonesia	11.45-12.00

ICSERA 2						
Wednesday, July 26, 2017 13.00-15.30						
Bandung Room 2nd fl						
No	Paper #	ID	Author	Title	Affiliation	Time
1	496	ICSERA2 - 1	Dyah Arum Wulandari, Nasruddin, Lemington and R Z Wang	Studies of the Water Adsorption on Lampung's Natural Zeolite of Indonesia for Cooling Application	Universitas Indonesia, Indonesia	13.00-13.15
2	682	ICSERA2 - 2	Edy Susanto, Muhammad Idrus, Nasruddin Nasruddin and Budihardjo Budihardjo	Characteristics Air Flow in Room Chamber Test Refrigerator Household Energy Consumption with Inlet Flow Variation	Universitas Indonesia, Indonesia	13.15-13.30
3	845	ICSERA2 - 3	Ardiyansyah Yatim, Muhammad Idrus Alhamid, Budihardjo Budihardjo, Dicky Alamsyah and Hotdian Sinambela	Experimental Study on Thermal Performance of Refrigerants in Microchannel Heat Exchangers for AC Applications	Universitas Indonesia, Indonesia	13.30-13.45
4	889	ICSERA2 - 4	Jong-Taek Oh, Ba Chien Nguyen and Pham Quang Vu	Investigation of Flow Boiling Heat Transfer Coefficient of R410A in Various Minichannel Multiport Tubes	Chonnam National University, South Korea	13.45-14.00
5	896	ICSERA2 - 5	Honghyun Cho, Yunchan Shin and Woobin Kang	Economic and Environmental Analyisis Depending on the Concentration of Al2O3 Nanofluid U-Tube Solar Collector	Chosun University, South Korea	14.15-14.30
6	905	ICSERA2 - 6	Jae Dong Chung, Min Ho Kim and Yong Tae Lee	A New Method Using Effect Thermal Conductivity for a Full Thermal Storage Tank	Sejong University, South Korea	14.30-14.45
7	920	ICSERA2 - 7	Nguyen-Ba Chien and Jong-Taek Oh	Investigation of Optimal Design of Flow Header in Heat Exchangers	Chonnam National University, South Korea	14.45-15.00
8	922	ICSERA2 - 8	Pham Quang Vu, Kwang-Il Choi, Jonng-Taek Oh and Honggi Cho	Pressure Drop during Condensation of R410A Inside Horizontal Multiport Mini-channels Rectangular Tubes	Chonnam National University, South Korea	15.00-15.15
9	923	ICSERA2 - 9	Pham Quang Vu, Kwang-Il Choi, Jonng-Taek Oh and Honggi Cho	Experimental Study of Condensation Heat Transfer of R410A, R32 and R22 Inside a Micro-fin Copper Tube	Chonnam National University, South Korea	15.15-15.30

ICSERA 3						
Wednesday, July 26, 2017 15.45-18.00						
Bandung Room 2nd fl						
No	Paper #	ID	Author	Title	Affiliation	Time
1	934	ICSERA3 - 1	Agung Satrio Wibowo and Nasruddin Nasruddin	Multi-Objective Optimization and Implementation of Double Stage Absorption Absorption System to Improve Kamojang 5 GPP's Performance	Universitas Indonesia, Indonesia	15.45-16.00
2	935	ICSERA3 - 2	Yodi S., Nasruddin Nasruddin and Nanang K.	Level of Effectiveness of Risk-Based Inspection Program by Using the Semi-Quantitative API 581 Method on Geothermal Power Plants (GPPs) in Indonesia	Universitas Indonesia, Indonesia	16.00-16.15
3	936	ICSERA3 - 3	Nasruddin Nasruddin, Nanang K., Dimas P. and Sherly Sherly	Comparison Critical Analysis among FMEA, FMEA Fuzzy Logic, and FMEA TOPSIS on Geothermal Steam Turbine System	Universitas Indonesia, Indonesia	16.15-16.30
4	912	ICSERA3 - 4	Kwang Pyo Lee, Byung Ryeon Kim and Chan Woo Park	A Study on Optimization Design of Water-Cooled Heat Sink Plate for Inverter Cooling of Turbo Chiller	Chonbuk National University, South Korea	16.30-16.45
5	805	ICSERA3 - 5	Muhammad Arif Budiyanto, Nasruddin Nasruddin and Fariz Zhafari	Simulation Study on the Estimation of Energy Consumption of Refrigerated Container	Universitas Indonesia, Indonesia	16.45-17.00

I-Dwell Plenary

Tuesday, July 25, 2017 10.15-10.30

Lotus Room 3rd fl

Invited Speaker : Ashok Das (University of Hawaii), USA

I-Dwell Plenary

Tuesday, July 25, 2017 10.30-10.45

Lotus Room 3rd fl

Invited Speaker : Margareth Petty (QUT), Australia
Curtaining the Curtain Wall: Traversing the Boundaries of the Modern Postwar Home

I-Dwell 1A : CONTEXT AND SUBSTANCE

Tuesday, July 25, 2017 11.00-12.00

Lotus Room 3rd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	20	I-Dwell1A - 1	Yulia E. Putrie and Widjaja Martokusumo	From Negotiating Identity to Claiming Space: An Outlook on Socio-Political Dynamics of Community Mosques in Malang, East Java	Bandung Institute of Technology, Indonesia	11.00-11.15
2	71	I-Dwell1A - 2	Edy Darmawan, Suzanna Ratih Sari and Adhisti Samsinar Enis	The Visual Aesthetic of Landscape in Semarang	Diponegoro University, Indonesia	11.15-11.30
3	292	I-Dwell1A - 3	Enira Arvanda and Amy Karmia Marku	Choreographing Flow and Pause: Inhabiting Transitional Space	Universitas Indonesia, Indonesia	11.30-11.45
4	444	I-Dwell1A - 4	Herry Santosa	Evaluation of Dome House Deisgn Against the Local Context on Post-Earthquake Housing Relocation at Dusun Nglepen, Yogyakarta, Indonesia	Brawijaya University, Indonesia	11.45-12.00

I-Dwell 1B : BUILDING TECHNOLOGY						
Tuesday, July 25, 2017 11.00-12.00 **Jasmine Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	118	I-Dwell1B - 1	Rossa Turpuk Gabe, Gregorius A Gegana A and Ima Rachima	A Luxurious Prefabricated House: A Different Way of Understanding Prefabication Housing	University of Pelita Harapan, Indonesia	11.00-11.15
2	220	I-Dwell1B - 2	Erni Setyowati and Edward E. Pandelaki	The Concept of Sustainable Prefab Modular Housing Made of Natural Fiber Reinforced Polymer	Diponegoro University, Indonesia	11.15-11.30
3	103	I-Dwell1B - 3	Indri Lestari Juwono	Enhancement of the Green Environment to Support the Use of Natural Materials in Traditional Housing	Universitas Indonesia, Indonesia	11.30-11.45
4	113	I-Dwell1B - 4	Ade Prasetya	Thermal Effectiveness of Wall Indoor Fountain in Warm Humid Climate	Atma Jaya University Jogjaarta, Indonesia	11.45-12.00

I-Dwell 2 : [IM]POSSIBILITY OF DWELLING: UTOPIA, DYSTOPIA, ECOTOPIA IN PLANNING & DESIGN						
Tuesday, July 25, 2017 13.00-14.30 **Lotus Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	543	I-Dwell2 - 1	Silfia Mona Aryani	The Designn Transformation of Public Housing Units with Short Period Occupancy	Sebelas Maret University, Indonesia	13.00-13.15
2	581	I-Dwell2 - 2	Anastasia Maurina, Budianastas Prastyatama, Carissa, Altho Sagara, Sisi Nova Rizkiani, Buen Sian and Jung Eun Shin	Bumi Awi Kabula Kabale: A Proposal to Alter the Fate of Mankind Through Adaptive Structure	Parahyangan Catholic University, Indonesia	13.15-13.30
3	598	I-Dwell2 - 3	Bangun I.R. Harsritanto, Bintang N. Prabowo, Resza Riskiyanto, Arnis R Harani And Mirza Ramandhika	Spatial Transformation Pattern Due to Commercial Activity in Kampung Houses	Diponegoro University, Indonesia	13.30-13.45
4	291	I-Dwell2 - 4	Triatno Yudo Harjoko	I DWELL In [Im]possibility: Utopian Planning & Design in Indonesia Toward a City of One Dimensional-Society	Universitas Indonesia, Indonesia	13.45-14.00

I-Dwell 3 : [IM]POSSIBILITY OF DWELLING: IDENTITIES						
Tuesday, July 25, 2017 14.30-16.00 **Lotus Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	318	I-Dwell3 - 1	Eka Permanasari and Bonardo Tobing	I DWELL in Fluid Space: Reading Smooth and Striated Space in Pasar Ciputat, South Tangerang	Pembangunan Jaya University, Indonesia	14.30-14.45
2	893	I-Dwell3 - 2	Mira Lubis, Triatno Yudo Harjoko and Dalhar Susanto	The Floating Houses of Sintang City: Space, Resources and Political Nexus	Universitas Indonesia, Indonesia	14.45-15.00
3	861	I-Dwell3 - 3	Yulia Nurliani Lukito and Bella Previta Handoko	The Crux of Minimalist Architecture: A Local Strategy of Housing Design in Jakarta or a Break Free From Traditions?	Universitas Indonesia, Indonesia	15.15-15.30
4	585	I-Dwell3 - 4	Budianastas Prastyatama and Anastasia Maurina	Material Studies at the Possible Channel to Re-Connect Dwelling and Building	Parahyangan Catholic University, Indonesia	15.30-15.45
5	635	I-Dwell3 - 5	Yanita Mila Ardiani and Noegroho Noegroho	Phenomenology of the Development the Outside Area in the Densely Populated Housing's Settlement in Indonesia	Binus University, Indonesia	15.45-16.00

I-Dwell 4 : [IM]POSSIBILITY OF DWELLING: IDENTITIES						
Tuesday, July 25, 2017 16.00-17.30 **Lotus Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	190	I-Dwell4 - 1	Intan Chairunnisa and Dita Trisnawan	Hierarchy of Home Forms Homey Feeling for Seniors (Case Study: X Senior Living, Jawa Barat)	Universitas Indonesia, Indonesia	16.00-16.15
2	230	I-Dwell4 - 2	Nevine Rafa Kusuma, Rossa Turpuk Gabe Simatupang and Triatno Y. Harjoko	Community Engangement and Children Spatial Needs in Rusun Kemayoran	Universitas Indonesia, Indonesia	16.15-16.30
3	268	I-Dwell4 - 3	Yulia Nurliani Lukito and Cika Kasturi Supria	Translation of Rumah Ulu, South Sumatra, Into a Modern House	Universitas Indonesia, Indonesia	16.30-16.45
4	708	I-Dwell4 - 4	Wendy Hakim	Co-Residency Among Migrants in Balikpapan East Kalimantan Indonesia	Universitas Indonesia, Indonesia	16.45-17.00

MAT Plenary 1

Tuesday, July 25, 2017 13.00-13.30

Mangupura Ballroom 1st fl

Invited Speaker : Prof. Dr. H.J. Heeres (Rijksuniversiteit Groningen), Netherland

Mat 1A : Polymer & Nanomaterials

Tuesday, July 25, 2017 13.30-15.00

Mangupura Ballroom 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	485	MAT1A - 1	Mochamad Chalid, Ghiska Ramahdhita and Ismojo -	Feasibility Study of a Chemical Treatments Sequence on Sorghum Fibers Compatibility Enhancement in Polypropylene Composites	Universitas Indonesia, Indonesia	13.30-13.45
2	684	MAT1A - 2	Cahyo Budiyantoro	The Influence of Nano Filler on the Thermal and Mechanical Properties of PP	Muhammadiyah University of Yogyakarta, Indonesia	13.45-14.00
3	232	MAT1A - 3	Dani Gustaman Syarif, Djoko Hadi Prajitno and Efrizon Umar	Characteristics of Nanofluids Made from Solgel Synthesized-Al2O3 Nanoparticles Utilizing Citric Acid and PEG as Organic Agent and Bauxite as Raw Material	Center for Applied Nuclear Science and Technology, Indonesia	14.00-14.15
4	925	MAT1A - 4	Arbi Irsyad Fikri, Hanindito Haidar Satrio, Muhammad Joshua Y. B., Mochamad Chalid and Jaka Fajar Fatriansyah	The Investigation of The Melting Temperature Effect on The Rate of Solidification In Polymer Using Modified Phase-Field Model	Universitas Indonesia, Indonesia	14.15-14.30
5	937	MAT1A - 5	Nofrijon Sofyan, Aga Ridhova, Akhmad Herman Yuwono, Arief Udhiarto	Preparation of Anatase TiO2 Nanoparticles Using Low Hydrothermal Temperature for Dye-Sensitized Solar Cell	Universitas Indonesia, Indonesia	14.30-14.45
6	938	MAT1A - 6	Ahmad Herman Yuwono, Amalia Sholehah, Nofrijon Sofyan, Latifa Hanum Lalasari	One Dimensional Inorganic Semiconductor Oxides Nanostructures derived from Wet-Chemistry Routes and Post-Hydrothermal Treatment	Universitas Indonesia, Indonesia	14.45-15.00

MAT 1B : Porous Materials & Solar Cell

Tuesday, July 25, 2017 13.30-15.00

Mangupura Ballroom 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	379	MAT1B - 1	Jaka Fajar Fatriansyah, Tryatmaja Matari and Sri Harjanto	The Preparation of Activated Carbon from Coconut Shell Charcoal by Novel Mechano-Chemical Activation Method	Universitas Indonesia, Indonesia	13.30-13.45
2	264	MAT1B - 2	Nofrijon Sofyan, Aga Ridhova, Akhmad Herman Yuwono and Arief Udhiarto	Fabrication of Solar Cells with TiO2 Nanoparticles Sensitized Using Natural Dye Extracted from Mangosteen Pericarps	Universitas Indonesia, Indonesia	13.45-14.00
3	319	MAT1B - 3	Erlyta Septa Rosa, Natalita Maulani Nursam, Shobih and Rizky Abdillah	Improving the Efficiency of Perovskite Solar Cell through the Addition of Compact Layer under the Electron Transfer Material	Indonesian Institute of Science, Indonesia	14.00-14.15
4	804	MAT1B - 4	Rangga Winantyo and Kenji Murakami	ZnO-Nanorods Formation for Dye Sensitized Solar Cells Applications	Multimedia Nusantara University, Indonesia	14.15-14.30
5	407	MAT1B - 5	Cipta Panghegar Supriadi, Evvy Kartini, Wagiyo Honggowiranto and Kris Tri Basuki	Synthesis and Characterization of Carbon Material Obtained from Coconut Coir Dust by Hydrothermal and Pyrolysis	Polytechnic Institute of Nuclear Technology, Indonesia	14.30-14.45
6	184	MAT1B - 6	Vika Rizkia, Badrul Munir, Bambang Suharno and Johny Wahyuadi Soedarsono	An Analysis on the Effect of the Electrolyte Resistivity Over the Geometric Features (i.e. Pore Diameter and Pore Density) of Anodic Aluminium Oxide (AAO) Films Produced by Single-step Anodization	Politeknik Negeri Jakarta, Indonesia	14.45-15.00
7	301	MAT1B - 7	Luh Putu Ike Midiani and I Wayan Nata Septiadi	The Characterization of Pore Structure and Capillary Sintered Basalt for Wick Heat Pipe Developed	Bali State Polytechnic, Indonesia	15.00-15.15

MAT 2 : Casting Process						
Tuesday, July 25, 2017 15.15-18.00 **Frangipani Room 1st fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	17	MAT2 - 1	Hafid Abdullah and Sri Bimo Pratomo	The Implementation of the Track Link Tank Manufacturing for a Light Type Army Tank as a Substitution Imported	Metal Industries Development Centre, Indonesia	15.15-15.30
2	280	MAT2 - 2	Anne Zulfia, Egy Ciptia Putro, Reza Mohammad Aditya and Sergi Andiva	The Role of Sr and TiB on Mechanical Properties of Aluminium 6061 Composite Produced Through Stir Casting Method	Universitas Indonesia, Indonesia	15.30-15.45
3	293	MAT2 - 3	Donanta Dhaneswara, Anne Zulfia Syahrial, Luthfi Noviardi Andani and Nofrijon Sofyan	Mechanical Properties of Nano SiC-Reinforced Aluminum A356 Fabricated by Stir Casting Method	Universitas Indonesia, Indonesia	15.45-16.00
4	771	MAT2 - 4	Donanta Dhaneswara, Anne Zulfia Syahrial and Raka Nuralif Verdiyanto	Mechanical Properties of Al2O3-Reinforced Aluminum A356 with Grain Refiner Al-5Ti-1B Fabricated by Stir Casting Method	Universitas Indonesia, Indonesia	16.00-16.15
5	829	MAT2 - 5	Rachman Kurnia and Bondan Tiara Sofyan	Effect of Cold Rolling and Annealing Temperature on the Recrystallization and Mechanical Properties of Al-4.7Zn-1.8Mg (wt. %) Alloy Fabricated by Squeeze Casting	Universitas Indonesia, Indonesia	16.15-16.30
6	269	MAT2 - 6	Hasan Akhyar, Priyo Tri Iswanto and Viktor Malau	Effect of casting temperature, T4 and T6 heat treatment on tensile strength of Al-5.9Cu-1.9Mg alloy	Syiah Kuala University, Indonesia	16.30-16.45
7	412	MAT2 - 7	Bambang Suharno, Sugeng Supriyadi, Gerra Maulana and Rizki Hidayatullah	Debinding Rate Enhancement of 17-4 Precipitation Hardening Stainless Steel Solvent Debinding on Metal Injection Molding Process as the Material for Orthodontic Bracket	Universitas Indonesia, Indonesia	16.45-17.00
8	897	MAT2 - 8	Rianti Dewi Sulamet-Ariobimo, Yun Gemilang, Dhonanta Dhaneswara, Johny Wahyuadi Soedarsono and Bambang Suharno	Casting Design Modification to Improved Casting Yield in Producing Thin Wall Ductile Iron Plate	Trisakti University, Indonesia	17.00-17.15

MAT Plenary 2

Wednesday, July 26, 2017 08.00-08.30

Mangupura Ballroom 1st fl

Invited speaker : Prof. Hiroshi Nishikawa (JWRI), JAPAN

MAT 3A : Lithium Battery						
Wednesday, July 26, 2017 08.30-10.00						
Mangupura Ballroom 1st fl						
No	Paper #	ID	Author	Title	Affiliation	Time
1	137	MAT3A - 1	Heri Jodi, Anne Zulfia, Sudaryanto Sudaryanto and Evvy Kartini	Synthesis and Electrochemical Characterization of New Li2O-P2O5 Compounds for Solid Electrolytes.	National Nuclear Energy Agency of Indonesia, Indonesia	08.30-08.45
2	289	MAT3A - 2	Bambang Priyono, Nita Dianova, Anne Zulfia Syahrial and Achmad Subhan	Optimizing Li4Ti5O12 Anode Performance Using Silicon-Nano Particle for Half Cells Li-Ion Battery as Prepared by Hydrothermal Mechanochemical Using Li2CO3 as Li+-ion source	Universitas Indonesia, Indonesia	08.45-09.00
3	265	MAT3A - 3	Nofrijon Sofyan, Adlan Mizan, Anne Zulfia and Achmad Subhan	Characteristic of LiFe(1-x)VxPO4/C Using Carbon Pyrolyzed from Table Sugar for Lithium Ion Battery Cathode	Universitas Indonesia, Indonesia	09.00-09.15
4	459	MAT3A - 4	Sudaryanto Sudaryanto, Evi Yulianti and Nur Shofiana Khoironi	Molecular and Ionic Mobility of Chitosan Based Solid Polymer Electrolyte for Lithium-Ion Battery	National Nuclear Energy Agency of Indonesia, Indonesia	09.15-09.30
5	366	MAT3A - 5	Achmad Subhan, Dedy Setiawan and Sitti Ahmiatri Saptari	Preparation and Ionic Conductivity of Li3.9Ca0.1Ti5O12 Using Waste Chicken Eggshells as Ca Source for Anode Material of Lithium Ion Batteries	Indonesian Institute of Science (LIPI), Indonesia	09.30-09.45

MAT 3B : Welding and Heat Treatment						
Wednesday, July 26, 2017 08.30-10.00 **Frangipani Room 1st fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	531	MAT3B - 1	Andi Rustandi and Suganta Handaru	Flux Coating Effect of SMAW 308L Electrode on Its Mechanical Properties and Corrosion Resistance for Cryogenic Application	Universitas Indonesia, Indonesia	08.30-08.45
2	144	MAT3B - 2	Winarto Winarto, Muhammad Anis and Refnaldi Refnaldi	Effect of Repeated Weld-Repairs on Microstructural and Mechanical Properties of Stainless Steel 304L and 316L	Universitas Indonesia, Indonesia	08.45-09.00
3	334	MAT3B - 3	Parikin Parikin, Mohammad Dani, Abu Khalid Riva'I, Agus Hadi Ismoyo, Muhammad Riza Iskandar and Arbi Dimyati	Micro-Crystal Structures and Hardness of the Experimental 57Fe15Cr25Ni0.34C Steel Around the TIG-Welding	National Nuclear Energy Agency of Indonesia, Indonesia	09.00-09.15
4	251	MAT3B - 4	Wahyuaji Narottama Putra, Pandega Pramadtya Putra Pramuka and Myrna Ariati Mochtar	Effect of Sub-Zero Treatment on Microstructures, Mechanical Properties, and Dimensional Stability of AISI D2 Cold Work Tool Steel	Universitas Indonesia, Indonesia	09.15-09.30
5	77	MAT3B - 5	Zuldesmi Mansjur and Hendro Maxwell Sumual	Enhancement of Mechanical Properties of Cast Beta-Type Titanium Alloy by Aging Treatment	Manado State University, Indonesia	09.30-09.45
6	441	MAT3B - 6	Myrna Ariati	Optimizing of the Substrate Preheating Process to the Mechanical Properties of Cobalt-Based Alloy Coating on Alloy and Carbon Steel with High Velocity Oxygen Fuel (HVOF) Method	Universitas Indonesia, Indonesia	09.45-10.00

MAT 4 : Corrosions and Protection Materials						
Wednesday, July 26, 2017 10.15-12.00 **Frangipani Room 1st fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	446	MAT4 - 1	Norman Subekti, Johny Wahyuadi Soedarsono, Andi Rustandi and Adam Septiyono Arlan	Corrosion Inhibition by a Caesalpinia Sappan L Modified Imidazoline for Carbon Steel API 5L Grade X60 in HCl 1M Environment	Universitas Indonesia, Indonesia	10.15-10.30
2	24	MAT4 - 2	I Wayan Yuda Semaradipta	Enhancement of CUI Inspection Program on Insulated Dead-Leg Piping in LNG Plant Bontang	PT Badak LNG, Indonesia	10.30-10.45
3	929	MAT4 - 3	Andi Rustandi, Nuradityatama Nuradityatama, M. Faisal Rendi and Suganta Setiawan	Comparison of Pitting Corrosion Resistance of Austenitic Stainless Steel 304L and 316L Exposed to Aqueous Sodium Chloride Solution	Universitas Indonesia, Indonesia	10.45-11.00
4	254	MAT4 - 4	Deni Ferdian, Yudha Pratesa and Ahmad Angga Utama	Development of Al-5%Zn -Si as a Low Voltage Sacrificial Anode	Universitas Indonesia, Indonesia	11.00-11.15
5	554	MAT4 - 5	Harris Prabowo, Johny Wahyuadi Soedarsono, Badrul Munir, Andi Rustandi and Yudha Pratesa	Predicting Models of CO2 Materials Piping/Pipeline for PERTAMINA's CO2 EOR Programs: Field Data, Software Simulation and Laboratory	Universitas Indonesia, Indonesia	11.15-11.30
6	429	MAT4 - 6	Rio Pudjidarma Santoso and Rini Riastuti	Corrosion Evaluation of Heat Recovery Steam Generator Superheater Tube In Two Methods of Testing: Tafel polarization and Electrochemical Impedance Spectroscopy (EIS)	Universitas Indonesia, Indonesia	11.30-11.45

MAT 5A : Extraction & Remaining Life Assessment						
Wednesday, July 26, 2017 14.00-15.30 **Orchid Room 1st fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	183	MAT5A - 1	Soesaptri Oediyani, Paramita Juwita Sari and Djoko Hadi Prayitno	The Effect of Coal Composition and Slag Basicity on Yield of Pig Iron	Sultan Ageng Tirtayasa University, Indonesia	14.00-14.15
2	489	MAT5A - 2	Ahmad Maksum, Michael Kelvin E Husein, Sulaksana Permana, Andi Rustandi and Johny Wahyuadi Soedarsono	A Preliminary Study on the Reduction of Limonite Ore by Using Rice Husk as a Reducing Agent	Universitas Indonesia, Indonesia	14.15-14.30
3	509	MAT5A - 3	Sulaksana Permana, Jonathan Kriswanto Hutauruk, Ryand Adhyputra, Ahmad Maksum, Johny Wahyuadi Soedarsono, Andi Rustandi, Kurnia Setiawan Widana, Kurnia Trinopiawan and Mutia Anggraini	Upgrading Tantalum and Niobium Oxides Content in Bangka Tin Slag with Double Leaching	Universitas Indonesia, Indonesia	14.30-14.45
4	330	MAT5A - 4	Himawan Tri Bayu Murti Petrus, Andreas Diga Pratama, Yosua Pangihutan Sihotang, Arini Muthiah Rosmaya Putri and Widi Astuti	Nickel Recovery from Hydrocracking Spent Catalyst using Acetic Acid: Leaching Performance and Kinetics Study	Gajah Mada University, Indonesia	14.45-15.00
5	321	MAT5A - 5	Vicky Indrafusa	Risk-Based Approach for Remaining Useful Life (RUL) Assessment of LNG/LPG Tank Badak LNG	PT Badak LNG, Indonesia	15.00-15.15
6	305	MAT5A - 6	Luthfi Ardiansyah	Remaining Life Assessment of Fiber Reinforced Plastic (FRP) Pipe in LNG Plant after 20 Years in Operation	PT Badak LNG, Indonesia	15.15-15.30

MAT 5B : Composite and Ceramics Materials

Wednesday, July 26, 2017 14.00-15.30

Bougenville Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	706	MAT5B - 1	I.D.G Ary Subagia, Ni Made Dwidiani, Ahmad Herman Yuwono, I Ketut Gede Sugita and I Ketut Gede Wirawan	Thermal Conductity Carbon/Basalt Fibers Reinforced Epoxy Hybrid Composites	Udayana University, Indonesia	14.00-14.15
2	482	MAT5B - 2	Jefri Bale, Dominggus Adoe and Kristomus Boimau	The Tensile Strength of Mechanical Joint Prototype of Lontar Fiber Composite	University of Nusa Cendana, Indonesia	14.15-14.30
3	472	MAT5B - 3	Fiska Yohana Purwaningtyas, Yuni Kusumastuti, Himawan Tri Bayu Murni Petrus and Budhijanto Budhijanto	Synthesis and Characterization Chitosan/Alginate/Geothermal Silica Scaffold	Gadjah Mada University, Indonesia	14.30-14.45
4	11	MAT5B - 4	H Aripin, Seitaro Mitsudo, I Nyoman Sudiana, Edvin Priatna, Nundang Busaeri and Svilen Sabchevski	Formation and Particle Growth of TiO2 in Silica Xerogel Glass Ceramic During a Sintering Process	Siliwangi University, Indonesia	14.45-15.00
5	656	MAT5B - 5	Gandjar Pamudji, Bimasena Heribowo, Adam Yuta Prayoga and Heru Purnomo	Bond-Slip Behavior of Steel Bar Embedded in Lightweight Concrete Using Polypropylene Coarse Aggregate Coated with Sand	Universitas Indonesia, Indonesia	15.00-15.15
6	569	MAT5B - 6	Musnajam Musnajam, Vita Astini and Fachryano Yatjong	Utilization of Fly Ash and Nickel Slag PT. Antam as Material Substitution for Concrete	University of Sembilanbelas November, Indonesia	15.15-15.30
7	510	MAT5B - 7	Perdamean Sebayang, Candra Kurniawan, Toto Sudiro, Didik Aryanto, Eko Arief Setiadi, Konni Tamba and Djuhana Djuhana	Preparation of Fe3O4/Bentonite Nanocomposite from Natural Iron Sand by Co-Precipitation Method for Adsorbents Materials	Indonesian Institute of Science (LIPI), Indonesia	15.30-15.45

MAT 6 : Electronic Materials

Wednesday, July 26, 2017 15.45-18.00

Orchid Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	157	MAT6 - 1	Ade Mulyawan, Wisnu Ari Adi, Salim Mustofa and Yunasfi Yunasfi	Raman Spectroscopy Study, Magnetic and Microwave Absorbing Properties of Modified Barium Strontium Monoferrite Ba(1-x)Sr(x)Fe2O4	National Nuclear Energy Agency of Indonesia, Indonesia	15.45-16.00
2	546	MAT6 - 2	Salim Mustofa, Wisnu Ari Adi, Anton Prasetyo, Veinardi Suendo and A. Agung Nugroho	Effect of Structural Transition on Magnetic Properties of Ba-Doped LaMnO3 Nanopowders Characterized by Raman Spectroscopy	National Nuclear Energy Agency of Indonesia, Indonesia	16.00-16.15
3	561	MAT6 - 3	Erfan Handoko and Nofrijon Sofyan	Double Layer Microwave Absorption Characteristics of Barium Hexaferrite/Silica Composite for X-Band Frequencies	Jakarta State University, Indonesia	16.15-16.30
4	326	MAT6 - 4	Masruroh Masruroh, Mahardika Auditia Hanif, Setyawan P Sakti and D. J. Djoko Santjojo	Effect Plasma Power on Surfaces of SiO2 Quartz Crystal during Etching by Using CH2FCF3 Gas	Brawijaya University, Indonesia	16.30-16.45
5	728	MAT6 - 5	Satrio Herbirowo, Hendrik Hendrik, Nofrijon Sofyan and Agung Imaduddin	Effect of SiC and Sintering Temperature Variations on the Characteristic of Fe-Sheathed MgB2 Superconductor Wires	Indonesian Institute of Sciences, Indonesia	16.45-17.00
6	314	MAT6 - 6	Akhmad Herman Yuwono, Tri Arini, Latifa Hanum Lalasari, Nofrijon Sofyan, Andaradhi Nararya, Ghiska Ramahdita, Florentinus Firdiyono, Lia Andriyah, Achmad Subhan and Chairul Hudaya	The Effect of Various Precursors and Solvents on the Characteristics of Fluorine-Doped Tin Oxide (FTO) Conducting Glass Fabricated by Ultrasonic Spray Pyrolysis	Universitas Indonesia, Indonesia	17.00-17.15
7	786	MAT6 - 7	Agus Subagio, Alfin Darari, Istajib S. Hakim, Priyono, Pardoyo and Achmad Subhan	Preparation and Characterization of Carbon Nanotube/Graphite/Zinc Oxide Composite as Supercapacitor Electrode Material	Diponegoro University, Indonesia	17.15-17.30
8	350	MAT6 - 8	Jarot Raharjo, Masmui Masmui and Damisih Damisih	Effect of the Rare Earth Oxide Impurities on teh Physical and Thermal Properties of Ce1-yGd1-xO2-1 (GDC) Composite Electrolytr IT-SOFC's	Agency For The Assessment and Aplication of Technology (BPPT), Indonesia	17.30-17.45

IE Plenary

Tuesday, July 25, 2017 13.00-13.30

Dahlia Room 1st fl

Invited speaker : Prof. Pekka Leviakangas (University of Oulu), Finland
Digitalisation of Industries – Observations, Evidence and Prospects

Tuesday, July 25, 2017 13.30-14.00

Dahlia Room 1st fl

Invited speaker : Prof. Marie-Anne Guerry (Vrij Universiteit Brussel), Belgium
Model Selection within the Class of Discrete-time Markovian Models

IE 1: Quality System 1

Tuesday, July 25, 2017 13.00-15.00

Dahlia Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	751	IE1 - 1	Amalia Suzianti, Shabila Anjani, Hatara Trirama, Tesar Dayansyah and Alviana Alicia Syafinal	Designing Mobile Application for Monitoring Children's Health and Development from User and Pediatrician Perspective	Universitas Indonesia, Indonesia	13.30-13.45
2	18	IE1 - 2	Hafid Abdullah and Eddy Herjanto	Improving Quality and Productivity Analysis as an Effort to Development the Supporting Industries in Indonesia	Metal Industries Development Centre (MIDC), Indonesia	13.45-14.00
3	162	IE1 - 3	Djoko Sihono Gabriel and Palito J. Endthen	Leveraging Motor Cycle Driving Satisfaction Through Vehicle Operation and Maintenance Quality Improvement	Universitas Indonesia, Indonesia	14.00-14.15
4	353	IE1 - 4	Djoko Sihono Gabriel and Muhammad Habiburrahman	Why Did Not All High Quality Products Always Satisfy Their Users? A Case Study of Motorcycles and Its Drivers	Universitas Indonesia, Indonesia	14.15-14.30
5	369	IE1 - 5	Widia Kurnia Adi, Teuku Yuri M. Zagloel and Fauzia Dianawati	Integration Model of Value Engineering (VE) – Lean Six Sigma (LSS) for Cost Management Program in Steelmaking Process	Universitas Indonesia, Indonesia	14.30-14.45
6	528	IE1 - 6	Mochammad Arbi Hadiyat	Incorporating Servqual- QFD with Taguchi Design for Optimizing Service Quality Design : A Case Study	University of Surabaya, Indonesia	14.45-15.00

IE 2: Quality System 2

Tuesday, July 25, 2017 15.15-18.00

Dahlia Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	591	IE2 - 1	Markus Hartono, Amelia Santoso and Dina Natalia Prayogo	How Kansei Engineering, Kano and QFD Improve Logistics Services	University of Surabaya, Indonesia	15.15-15.30
2	720	IE2 - 2	Boy Nurtjahyo Moch., Komarudin - and Maulana Senjaya Susilo	Development of Eye Fixation Points Prediction Model from Eye Tracking Data Using Neural Network	Universitas Indonesia, Indonesia	15.30-15.45
3	807	IE2 - 3	Julian Robecca	Proposed Improvements Footwear Using Six Sigma Method and Method of Quality Function Deployment in PT. Primarindo Asia Infrastructure Tbk.	Indonesian Computer University, Indonesia	15.45-16.00
4	812	IE2 - 4	Sugih Arijanto, Handi Wijaya and Cahyadi Nugraha	Performance Measurement's Software Development for Internal Assessment Based on MBCFPE KPKU BUMN	National Institute of Technology, Indonesia	16.00-16.15
5	885	IE2 - 5	Yadrifil Yadrifil, Rike Adyartie and Annisa Marlin Masbar Rus	Improving Effervescent Product Yield Through Lean-DMAIC Method: a Pharmaceutical Company Case	Universitas Indonesia, Indonesia	16.15-16.30
6	757	IE2 - 6	Amalia Suzianti, Nadira Winaputri and Serdi Akbar Maulana	Service Innovation Design for Platinum Members In Garuda Indonesia Sales and Service Office	Universitas Indonesia, Indonesia	16.30-16.45

IE 3: Risk Engineering

Wednesday, July 26, 2017 08.00-10.00

Dahlia Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	601	IE3 - 1	Dessi Mufti, Eva Suryani and Yusrizal Bakar	Job Risk Assesment Toward Labor Facilities Using Job Strain Index Method	Bung Hatta University, Indonesia	08.00-08.15
2	718	IE3 - 2	Maya Arlini Puspasari, Hardianto Iridiastadi, Iftikar Sutalaksana and Ade Sjafruddin	Effect of Driving Duration Towards EEG Fluctuations	Universitas Indonesia, Indonesia	08.15-08.30
3	356	IE3 - 3	Khawarita Siregar and Syahrul Fauzi Siregar	The Cause Analysis of Gloves and Soap Bar Defect Using Failure Mode and Effect Analysis (FMEA) in PT. XYZ	University of North Sumatera, Indonesia	08.30-08.45
4	558	IE3 - 4	Ayu Bidiawati and Lestari Setiawati	The Risk Assessment Work of Operator Based On Rapid Upper Limb Assessment Method (RULA) to Improvement of Work System	Bung Hatta University, Indonesia	08.45-09.00

5	745	IE3 - 5	Amalia Suzianti, Priandra Aditya Wattimena and Rheinanda Kaniaswari	Risk Management of New Product Development Process on Footwear Industry in Indonesia. Case Study : PT Brodo Ganesha Indonesia	Universitas Indonesia, Indonesia	09.00-09.15
6	860	IE3 - 6	Nanang Tri Wahyuna, Rahmat Nurcahyo and Yadrifil Yadrifil	Maintenance Strategy on Boiler System Steam Power Plant Based on Reliability Centered Maintenance (RCM)	Universitas Indonesia, Indonesia	09.15-09.30
7	868	IE3 - 7	Yadrifil Yadrifil, Anisa Fithrasari and Annisa Marlin Masbar Rus	Failure Risk Analysis on Core Network of GPRS Equipment Using FMEA & FTA Method and Scenario of Treatment Cost Allocation	Universitas Indonesia, Indonesia	09.30-09.45

IE 4: Ergonomics

Wednesday, July 26, 2017 10.15-12.00

Dahlia Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	181	IE4 - 1	Billy Muhamad Iqbal, Armand Omar Moeis and Renalda Krissalam	The Analysis of Ergonomic Design of Tactical Commander Console (TACCO) in the Virtual Environment of Medium-ranged Twin-engined Maritime Patrol Aircraft (MPA)	Universitas Indonesia, Indonesia	10.15-10.30
2	395	IE4 - 2	Lovely Lady and Nisfaeni	Optimal Physical Environment to Maintain Concentration on Office Work in Tropical Climate in Indonesia	Sultan Ageng Tirtayasa University, Indonesia	10.30-10.45
3	701	IE4 - 3	Iketut Widana	Mangusada Hospital Go to the Ergonomics Hospital	Bali State Polytechnic, Indonesia	10.45-11.00
4	707	IE4 - 4	Dwi Novirani and Gp Liansari	The Ergonomic Kue Balok Baking Tool Production which Fueled by Charcoal	National Institute of Technology, Indonesia	11.00-11.15
5	736	IE4 - 5	Danu Hadi Syaifullah, Maya Arlini Puspasari and Timotius Alfin	Neuromarketing Evaluation of Online Shop Advertisement Using Electroencephalogram (EEG)	Universitas Indonesia, Indonesia	11.15-11.30
6	759	IE4 - 6	Tegar Septyan	Integrating IDEAS Digital Human Modeling in Electronic Industry to Improve Human-System Performance	Universitas Indonesia, Indonesia	11.30-11.45

IE 5A: Sustainable Manufacturing and Public Policy						
Wednesday, July 26, 2017 13.00-14.30 **Dahlia Room 1st fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	166	IE5A - 1	Himawan Pranamukti, Akhmad Hidayatno, Armand Moeis and Naufa Muna	Managing Port Cluster Dynamics : Development of Port Policy Model	Universitas Indonesia, Indonesia	13.00-13.15
2	258	IE5A - 2	Hafid Abdullah	Analysis of Situation and Competitive Strategy Formulation for the Vision and Mission Towards the Year 2020 (Case: in MIDC Ministry of Industry Indonesia)	Metal Industries Development Centre (MIDC), Indonesia	13.15-13.30
3	267	IE5A - 3	Akhmad Hidayatno, Adinda Amalia and Arry Rahmawan Destyanto	Analysis of CO2 Emission Effect from Coal-fired Power Plant to Gross Domestic Regional Product at Jakarta	Universitas Indonesia, Indonesia	13.30-13.45
4	271	IE5A - 4	Arry Rahmawan Destyanto, Akhmad Hidayatno and Reinaldo Giovanni	Application of Technology Assesment in Carbon Capture and Storage Technology Implementation for CO2 Emission in Indonesia	Universitas Indonesia, Indonesia	13.45-14.00
5	353	IE5A - 5	Djoko Sihono Gabriel and Muhammad Habiburrahman	Why Did Not All High Quality Products Always Satisfy Their Users? A Case Study of Motorcycles and Its Drivers	Universitas Indonesia, Indonesia	14.00-14.15

IE 5B: Optimization						
Wednesday, July 26, 2017 13.00-14.30 **Bougenville Room 1st fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	685	IE5B - 1	Elisabeth Ginting and Mangara M. Tambunan	Application Study of Evolutionary Operation Methods in Optimization of Process Parameters for Mosquito Coils Industry	University of North Sumatera, Indonesia	13.00-13.15
2	884	IE5B - 2	Yadrifil Yadrifil, Irmawati Ulfah and Annisa Marlin Masbar Rus	Supplier Performance Evaluation Methods Using Data Envelopment Analysis Banker, Charnes, Cooper Model and Super Efficiency Model in Pumping Unit Producer	Universitas Indonesia, Indonesia	13.15-13.30

3	313	IE5B - 3	Zulkarnain, Komarudin, Armand Omar Moeis and Seto Banuwijoyo	Shipping Route Model Development for the Indonesian Pendulum Ports	Universitas Indonesia, Indonesia	13.30-13.45
4	228	IE5B - 4	Debrina Puspita Andriani, Muhammad Hafid Zamroni, Tiffany Clara Alesi and Fajri Rahman	The Layout Optimization of Production Process Facilities in Apple Processing to Improve Productivity and Sustainability SMEs	Brawijaya University, Indonesia	13.45-14.00
5	840	IE5B - 5	Farizal Farizal, Sucipto Sucipto and Amar Rachman	Optimization of Industrial Production Planning with Uncertain Raw Material Supply	Universitas Indonesia, Indonesia	14.00-14.15
6	250	IE5B - 6	Armand Moeis and Muhammad Harisuddin	Modeling and Simulation of Stacking Rules in Container Terminal with Discrete Event Simulation Approach	Universitas Indonesia, Indonesia	14.15-14.30
7	467	IE5B - 7	Romadhani Ardi, Armand Omar Moeis and Raymond Bonakapvi	A Simple Heuristic Algorithm for Stowage Planning in Containership	Universitas Indonesia, Indonesia	14.30-14.45

IE 5C: Manufacturing and Service System

Wednesday, July 26, 2017 13.00-14.30

Bougenville Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	10	IE5C - 1	Jonny Jonny and T. Yuri M. Zagloel	Developing and Implementing the Patient-centered Care Model for Hospital in Indonesia	Universitas Indonesia, Indonesia	13.00-13.15
2	439	IE5C - 2	Dewi Kusumawaty, Humala Napitupulu and Meilita Tryana Sembiring	Determination Standard Time Test Parameters of Testing Liquid Waste in Baristand Industri Medan	Research and Standardization Industry Medan (Baristand Industri Medan), Indonesia	13.15-13.30
3	725	IE5C - 3	Anita Christine Sembiring, Anggianika Mardatillah and Uni Pratama Pebrina Tarigan	The Improvement of Production Cost Efficiency Using Activity Based Costing in PT. XYZ	Prima Indonesia University, Indonesia	13.30-13.45
4	744	IE5C - 4	Harmein Nasution, Irwan Budiman and Agus Salim	The Material Handling Cost Analysis for Chinese Traditional Praying Paper Industry	University of North Sumatera, Indonesia	13.45-14.00
5	772	IE5C - 5	Erlinda Muslim, Irvan Riansa and Komarudin Komarudin	Analytic Hierarchy Process (AHP) Pairwise Matrix with One Missing Value	Universitas Indonesia, Indonesia	14.00-14.15
6	859	IE5C - 6	Annisa Marlin Masbar Rus, Rediani Pramudita and Isti Surjandari	Segmentation of Natural Gas Customers in Industrial Sector Using Self-organizing Map (SOM) Method	Universitas Indonesia, Indonesia	14.15-14.30

CHE 1

Tuesday, July 25, 2017 13.00-15.00

Jasmine Room 3rd fl

Moderator: Agustiono Julys Ph.D

No	Paper #	ID	Author	Title	Affiliation	Time
1	16	CHE1 - 1	Dhena Ria Barleany, Alpin Ilhami, Dea Yusuf Yudanto and Erizal	Degradation Behaviour of Gamma Irradiated Poly(Acrylic Acid)-graft-Chitosan Superabsorbent Hydrogel	Sultan Ageng Tirtayasa University, Indonesia	13.00-13.15
2	27	CHE1 - 2	Nelson Saksono, Trisutanti Budikania, Zainah Alattas and Ibrahim Ibrahim	The Use of Multi-Reactor Cascade Plasma Electrolysis for Linear Alkylbenzene Sulfonate Degradation	Universitas Indonesia, Indonesia	13.15-13.30
3	50	CHE1 - 3	Puguh Setyopratomo, Mahmud Sudibandriyo and Praswasti P.D.K. Wulan	Carbon Nanotubes Synthesis in Fluidized Bed Reactor Equipped with a Cyclone	Universitas Indonesia, Indonesia	13.30-13.45
4	156	CHE1 - 4	Nurhayati Abdullah, Fauziah Sulaiman and Aminu Aliyu Safana	An Assessment on The Effect of Torrefaction as a Pretreatment to Improve The Quality of Pyrolysis Products	University of Science, Malaysia	13.45-14.00
5	770	CHE1 - 5	Ilham Putra, Didin Mujahidin and Robby Roswanda	Preparation of Dimetil 9-Oktadekendioate and 9-Oktadecene from Methyl Oleate via Ruthenium-Catalyzed Homo Olefin Metathesis Reaction	Bandung Institute of Technologi, Indonesia	14.00-14.15
6	540	CHE1 - 6	Akhmad Zainal Abidin, Mega Natalia Harjandi, Vincent Wirawan and Sri Mulyani Suharno	Synthesis and Characterization of Methyltrihydroxysilane Water Repellent	Bandung Institute of Technologi, Indonesia	14.15-14.30
7	586	CHE1 - 7	Ahmad Zainal Abidin, Ibrahim Abdulfattah Suryawijaya, Arin Indiarni and Dhyna Analyes Trirahayu	Formulation Optimization and Characterization of Copolymer Acrylamide-(2-Acrylamido-2-Methylpropanesulfonic Acid) For Enhanced Oil Recovery (EOR)	Bandung Institute of Technologi, Indonesia	14.30-14.45

CHE 2A

Tuesday, July 25, 2017 15.15-17.15

Mangupura Ballroom 1st fl

Moderator: Dr. Anwar Usman

No	Paper #	ID	Author	Title	Affiliation	Time
1	283	CHE2A - 1	Sandyanto Adityosulindro, Laurie Barthe, Henri Delmas and Carine Julcour	Photo-Based Advanced Oxidation Processes for Removal of Pharmaceutical Compound in Water	Universitas Indonesia, Indonesia	15.15-15.30
2	302	CHE2A - 2	Nelson Saksono, Johannes Sasiang and Trisutanti Budikania	Hydrogen Generation by KOH-Ethanol Plasma Electrolysis Using Double Compartement Reactor	Universitas Indonesia, Indonesia	15.30-15.45
3	317	CHE2A - 3	Sutrasno Kartohardjono, Angeline Paramitha, Ryan Andriant and Aulia Andika Putri	Effects of Absorbent Flow rate on CO2 Absorption through Super Hydrophobic Hollow Fiber Membrane Contactor	Universitas Indonesia, Indonesia	15.45-16.00
4	320	CHE2A - 4	Sutrasno Kartohardjono, Kevin Alexander, Annisa Larasati and Ivander Christian Sihombing	Effects of Feed Gas Flow rate on CO2 Absorption through Super Hydrophobic Hollow Fiber Membrane Contactor	Universitas Indonesia, Indonesia	16.00-16.15
5	329	CHE2A - 5	Meinilwita Yulia and Diding Suhandy	The Feasibility of Using Explicit Method for Linear Correction of the Particle Size Variation Using NIR Spectroscopy Combined with PLS2 Regression Method	Lampung State Polytechnic, Indonesia	16.15-16.30
6	348	CHE2A - 6	Praswasti Pembangun Dyah Kencana Wulan, Sekar Hanun Ulwani, Widodo Wahyu Purwanto, Kamarza Mulia and Hanifia Wulandari	The Effect of Hydrochloric Acid Addition to Increase Carbon Nanotubes Dispersibility as Drug Delivery System by Covalent Functionalization	Universitas Indonesia, Indonesia	16.30-16.45
7	406	CHE2A - 7	Suci Madhania, Anugrah Budi Cahyani, Tantular Nurtono, Yuswan Muharam, Sugeng Winardi and Widodo Purwanto	CFD Study of Mixing Miscible Liquid with High Viscosity Difference in a Stirred Tank	Universitas Indonesia, Indonesia	16.45-17.00
8	755	CHE2A - 8	Yani Faozani Alli, Dadan Damayandri and Yan Irawan	The Effect of Anionic and Nonionic Co-Surfactant for Improving Solubility of Polyoxy-Based Surfactant for Chemical Flooding	Research and Development Centre For Oil and Gas Technology, Indonesia	17.00-17.15

CHE 2B

Tuesday, July 25, 2017 15.15-17.15

Jasmine Room 3rd fl

Moderator Dr. Khairul

No	Paper #	ID	Author	Title	Affiliation	Time
1	787	CHE2B - 1	Anies Mutiari and Pramujo Widiyatmoko	Development Method of Making Dye Sensitized Solar Cell (DSSC) using Carbon as Counter Electrode	Center for Material and Technical Product Ministry of Industry of Indonesia, Indonesia	15.15-15.30
2	774	CHE2B - 2	Astrini Pradyasti, Adinda Sofura Azhariyah and Setijo Bismo	Characterisation of Activated Carbon as a Support to Zinc Oxide Catalyst for Ozone Decomposition in Effluent Gas Emission	Universitas Indonesia, Indonesia	15.30-15.45
3	824	CHE2B - 3	Yenny Meliana, Melati Septiyanti, Feni Amriani, Syahrul Aiman, Veny Luvita and Savitri Savitri	Emulsion Stability of Fungicide from Eugenol and Citronellal Oil in 350 EC Formulation	Indonesian Institute of Sciences, Indonesia	15.45-16.00
4	825	CHE2B - 4	Is Fatimah, Lusi Sopia, Andita Ainun Naafi, Dikha Utami Trisnawati and Sim Yoke Leng	Study on Physicochemical Evolution of Silica in the Preparation of TiO2-SiO2 Aerogel From Bamboo Leaves for Dye Photoxidation Application	Islamic University of Indonesia, Indonesia	16.00-16.15
5	833	CHE2B - 5	Hendra Wijaksana, Nengah Suarnadwipa and Ketut Astawa	The Investigation of Influence Ammonia Concentration Variations to The Performances of Ammonia-Aqua Absorption Refrigeration System	Udayana University, Indonesia	16.15-16.30
6	834	CHE2B - 6	Mui Nyuk Chai, M. M. Chai and M. I. N. Isa	Mechanical Properties Of Carboxymethyl Cellulose-Oleic Acid Solid Biopolymer Electrolyte	University of Malaysia, Terengganu, Malaysia	16.30-16.45
7	802	CHE2B - 7	Lies Aisyah, Cahyo Setyo Wibowo, Sylvia Ayu Bethari, Dziki Ufidian Alwi and Riesta Anggarani	Monoglyceride Contents in Biodiesel from Various Plants Oil and The Effect to Low Temperature Properties	Research and Development Centre For Oil and Gas Technology, Indonesia	16.45-17.00
8	776	CHE2B - 8	Dian Purwitasari Dewanti, Dewi Tristantini and Eny Kusrini	Synthesis and Characterization Cellulose Acetate from Natural Fiber as A Substitute for Microbeads Polyethylene Environmentally Friendly	Universitas Indonesia, Indonesia	17.00-17.15

CHE Plenary

Wednesday, July 26, 2017 08.00-08.30

Jasmine Room 3rd fl

Invited speaker : Prof. Volkan Degirmenci (Warwick University), UK
Biomass utilization: Glucose Isomeration in ionic liquids and development of heterogeneous catalyst

Moderator: Dr. Eny Kusrini

CHE Plenary

Wednesday, July 26, 2017 08.00-08.30

Hibiscus Room 1st fl

Invited speaker : Prof. Joe Diniz da Costa (University of Queensland), Australia
The Brave New World of Scientific Publication

Moderator: Prof. Sutrasno Kartoharjono

CHE 3A

Wednesday, July 26, 2017 09.30-10.00

Jasmine Room 3rd fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	607	CHE3A - 1	Tine Aprianti	Ferrous and Aluminium Cations Removal in Acid Mine Drainage Using Powdered Activated Carbon Ceramic Adsorbent	Sriwijaya University, Indonesia	08.30-08.45
2	615	CHE3A - 2	Teguh Ariyanto, Gui-Rong Zhang, Andreas Kern and Bastian Jm Etzold	Preparation of Hollow Mesoporous Carbon Spheres and Their Performances for Electrochemical Applications	Gadjah Mada University, Indonesia	08.45-09.00
3	618	CHE3A - 3	Hery Sutanto, Luthfiyah Ainny, Lukman Kuntaji, Bambang Heru Susanto and Mohammad Nasikin	Reaction Product of Pyrogallol with Methyl Linoleate and its Antioxidant Potential for Biodiesel	Universitas Indonesia, Indonesia	09.00-09.15
4	619	CHE3A - 4	Teguh Ariyanto, Abby Vente, Rochim Bakti Cahyono, Stijn Mattheij, Ria Millati, Sarto and Siti Syamsiah	Utilization of Fruit Waste as Biogas Plant Feed and its Superiority Compared to Landfill	Gadjah Mada University, Indonesia	09.15-09.30

5	657	CHE3A - 5	Govinda Aris Saputra, Chandra Purnomo and Hary Sulistyo	The Study of Waste Plastic Pyrolysis using Natural Zeolite-Bentonite Catalyst	Gadjah Mada University, Indonesia	09.30-09.45
6	903	CHE3A - 6	Yuswan Muharam, Lisa Marie Zulkarnain and Andrey Sapati Wirya	Modeling of a Reactor-Distillation Column-Recycle System to Produce Dimethyl Ether through Methanol Dehydration	Universitas Indonesia, Indonesia	09.45-10.00

CHE 3B

Wednesday, July 26, 2017 08.30-10.00

Hibiscus Room 1st fl

No	Paper #	ID	Author	Title	Affiliation	Time
1	837	CHE3B - 1	Ratih Luhuring Tyas, Geni Rina Sunaryo and Heri Hermansyah	Hazard Identification of Primary Cooling System G.A Siwabessy Reactor	National Nuclear Energy Agency, Indonesia	08.30-08.45
2	931	CHE3B - 2	Abdul Wahid and Ferdi Fajrian Adicandra	OPTIMIZATION OF LNG REGASIFICATION PLANT USING MODEL PREDICTIVE CONTROL	Universitas Indonesia, Indonesia	08.45-09.00
3	846	CHE3B - 3	Aji Agraning Bawono and Eny Kusrini	Model of Formula and Price for Natural Gas through Pipeline for Household with Investment Scenario in Indonesia	Universitas Indonesia, indonesia	09.00-09.15
4	849	CHE3B - 4	Agustino Zulys, Fajar Prihatno, Afip Jaya Saputra and Sri Listyarini	Extraction of Nickel from Laterite using Phytic Acid and Salicylaldoxime	Universitas Indonesia, indonesia	09.15-09.30
5	850	CHE3B - 5	Ahmad Fadli, Amun Amri, Esty Octiana Sari, Iwantono Iwantono and Arisman Adnan	Crystal-Growth Kinetics of Magnetite (Fe3o4) Nanoparticles Using Ostwald Ripening Model	Riau University, Indonesia	09.30-09.45

CHE 4

Wednesday, July 26, 2017 10.15-12.00

Jasmine Room 3rd fl

Moderator: Dr. Bambang Heru Susanto

No	Paper #	ID	Author	Title	Affiliation	Time
1	909	CHE4 - 1	Dewi Tristantini and Clarissa Ancella	Diuretic Effect of Jamu Antiatherosclerosis by in Vivo Testing on Male Rats	Universitas Indonesia, Indonesia	10.15-10.30
2	407	CHE4 - 3	Cipta Panghegar Supriadi, Evvy Kartini, Wagiyo Honggowiranto and Kris Tri Basuki	Synthesis and Characterization of Carbon Material Obtained from Coconut Coir Dust by Hydrothermal and Pyrolisis	Polytechnic Institute of Nuclear Technology, Indonesia	10.30-10.45

3	623	CHE4 - 4	Agus Haryono and Sri Budi Harmami	Ionic Interaction Between Polystyrene Sulfonate and Cetyltrimethylammonium Bromide in Aqueous Solution	Indonesian Institute of Sciences, Indonesia	10.45- 11.00
4	686	CHE4 - 5	Fredina Destyorini, Indriyati Indriyati, Nanik Indayaningsih, Bambang Prihandoko and Anne Zulfia Syahrial	Properties of Carbon Composite Paper Derived from Coconut Coir as a Function of Polytetrafluoroethylene Content	Indonesian Institute of Sciences, Indonesia	11.00-11.15
5	463	CHE4 - 6	Ria Desiriani, Made Tri Ari Penia Kresnowati and I Gede Wenten	Membrane-Based Downstream Processing of Microbial Xylitol Production	Bandung Institute of Technology, Indonesia	11.15-11.30
6	739	CHE4 - 7	Elly Desni Rahman and Ellyta Sari	Determination of condition for Extraction Process Catechin From Gambier (Uncaria Gambier Roxb) Solok Bio Bio Lima Puluh Kota	Gadjah Mada University, Indonesia	11.30-11.45

CHE 5

Wednesday, July 26, 2017 14.00-15.30

Jasmine Room 3rd fl

Moderator : Prof. Dr. Nelson Saksono

No	Paper #	ID	Author	Title	Affiliation	Time
1.	915	CHE5 - 1	Chandra Wahyu Purnomo	Improvement of Cement Plant Dust Emission by Bag Filter System	Gadjah Mada University, Indonesia	14.00-14.15
2	874	CHE5 - 2	S N Putri and M Sudibandriyo	Hydrogen Recovery from Hydrogen-Methane Gas Mixture Utilized by Palm Shell Based Bioadsorbent Activated Carbon	Universitas Indonesia, Indonesia	14.15-14.30
3	875	CHE5 - 3	F Moulydia, N Salsabila, R K Dewi, A Nirmala and S Bismo	Burn Drug Made from Ozonated Vegetable Oil Mixture with White Tumeric and Cassava Leaves Extract	Universitas Indonesia, Indonesia	14.30-14.45
4	894	CHE5 - 4	Tine Aprianti, Selvia Aprilyanti, Rachma Apriani and Sisnayati	Studies on Biosorbent Adsorption Capacity of Sargassum Sp Combined with Clay for Hexavalent Chromium Removal in Wastewater	Sriwijaya University, Indonesia	14.45-15.00
5	895	CHE5 - 5	Suherman Suherman, Nadia Fridasaniya Azaria and Shelma Karami	Performance Study of Fludized Bed Dryer with Immersed Heater for Paddy Drying	Diponegoro University, Indonesia	15.00-15.15

6	866	CHE5 - 6	A G Dianty, A R S Harahap, C Harfian and S Bismo	Wet Impregnation of Silver Oxide on Lampung Natural Zeolite as an Adsorbent to Produce Oxygen-Enriched Air Using Psa Technique	Universitas Indonesia, Indonesia	15.15-15.30

CHE 6A

Wednesday, July 26, 2017 15.45-18.00

Jasmine Room 3rd fl

Moderator : Prof. Dr. Widodo Wahyu Purwanto

No	Paper #	ID	Author	Title	Affiliation	Time
1	658	CHE6A - 1	Ferdianta Sembiring, Suryo Purwono and Chandra Purnomo	Catalytic Pyrolysis of Waste Plastic Mixture	Gadjah Mada University, Indonesia	15.45-16.00
2	662	CHE6A - 2	Ellyta Sari, Pasymi, and Umar Khatab	Studies of Carbonization Process on The Production of Durian Peel Biobriquettes with Mixed Biomass Coconut and Palm Shells	Bung Hatta University, Indonesia	16.00-16.15
3	795	CHE6A - 3	Witri Wahyu Lestari, Riandy Putra and Bambang Heru Susanto	Green Diesel Production from Palm Oil using Klaten's Natural Zeolite Modified with Fe Metal Nanoparticle as Heterogeneous Catalyst	Sebelas Maret University, Indonesia	16.15-16.30
4	511	CHE6A - 4	Briantono Djakaria, Tjandra Setiadi and M.T. A. P Kresnowati	Evaluation of Tray Bioreactor to Upscale Xylanase Production using Solid State Fermentation of Oil Palm Empty Fruit Bunches (OPEFB) by Aspergillus Fumigatus	Bandung Institute of Technology, Indonesia	16.30-16.45
5	723	CHE6A - 5	Sri Ismiyati Damayanti, Simparmin Br Ginting, Amelia Virgiyani Sofyan, Alip Tania Putri and Wiratni Budhijanto	Utilization of Lampung Natural Zeolite as Immobilization Media on Biogas Production from Palm Oil Mill Effluent (POME)	Gadjah Mada University, Indonesia	16.45-17.00
6	730	CHE6A - 6	Yan Irawan, Ika Juliana, Yani Faozani Alli and Indri Badria Adilina	Aqueous Stability Studies of Polyethylene Glycol and Oleic Acid Based Anionic Surfactants for Application in Enhanced Oil Recovery through Dynamic Light Scattering Technique	Indonesian Institute of Sciences, Indonesia	17.00-17.15

BIO 1				
Tuesday, July 26, 2017 08.00-10.00 **Lotus Room 3rd fl**				
No	Author	Title	Affiliation	Time
1	Prof. Masafumi Yohda	Assembly of Encapsulin Nanocompartment from Rhodococcus erythropolis N771 and Encapsulation of a Guest Protein	Tokyo University of Agriculture and Technology, Japan	08.00 - 08.30
2	Dr. Mark Harrison	Development of Integrated Biorefineries for Sustainable Feed, Fuel, Fibre, and Fine Chemical Production	Queensland University of Technology, Australia	08.30 - 09.00
3	Prof. Naomi-Kitakawa and Kousuke Hiromi	Simultaneous Production of Vitamin E and Biodiesel from Deodorizer Distillate Obtained During Edible Oil Refining	Tohoku University, Japan	09.00 - 09.30

No	Paper #	ID	Author	Title	Affiliation	Time
1	418	BIO1 - 1	Ibnu Maulana Hidayatullah, Tania Surya Utami, Maharani Suci, Muhamad Sahlan, Anondho Wijanarko and Heri Hermansyah	Techno-Economic Analysis of Lipase Enzyme Production from Agro-Industry Waste with Solid State Fermentation Method	Universitas Indonesia, Indonesia	09.30-09.45
2	48	BIO1 - 2	Abdul Wahid and Hafizh Malik H. Taqwallah	Model Predictive Control based-on System Re-Identification (MPC-SRI) to Control Bio-H2 Production from BiomassBio-Hydrogen; Biomass; Control; Predictive; System Re-Identification	Universitas Indonesia, Indonesia	09.45-10.00

BIO 2						
Tuesday, July 26, 2017 10.15-12.00 **Lotus Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	544	BIO2 - 1	Melly Mellyanawaty, Firda Mahira Alfiata Chusna and Wiratni Budhijanto	Influence of Nutrient Addition into Zeolite as Microbial Immobilization Media in Anaerobic Digestion of POME	Muhammadiyah University of Tasikmalaya, Indonesia	10.15-10.30
2	361	BIO2 - 2	Awalina Satya, Eka Oktariani, Ardiyan Harimawan and Tjandra Setiadi	Batch Studies of Cadmium (II) Biosorption by Dried Aphanothece sp Biomass from Carbon Dioxide Fed Photobioreactors System	Bandung Institute of Technology, Indonesia	10.30 - 10.45
3	374	BIO2 - 3	Nadia Tuada Afnan, Heri Hermansyah, Tania Surya Utami, Muhamad Sahlan, Anondho Wijanarko and Danti Firda Nur	Producing Army Worm (Spodoptera sp.) Bioinsecticide based on Cysteine Protease of Red Ginger (Zingiber Officinale var. Rubrum)	Universitas Indonesia, Indonesia	10.45-11.00
4	391	BIO2 - 4	Ria Millati, Lukitawesa Lukitawesa, Ervina Permanasari, Kartika Sari, Muhammad Cahyanto, Claes Niklasson and Taherzadeh Mohammad	Anaerobic Digestion of Citrus Waste using Two-Stage Membrane Bioreactor	Gadjah Mada University, Indonesia	11.00-11.15
5	603	BIO2 - 5	Rochim B Cahyono, Sri Ismiyati, Simparmin Br Ginting and Wiratni Budhijanto	Characterization of Modified Zeolite as Microbial Immobilization Media on POME Anaerobic Digestion	Gadjah Mada University, Indonesia	11.15-11.30
6	611	BIO2 - 6	Laily Isna Ramadhani, Sri Ismiyati Damayanti Damayanti, Hanifrahmawan Sudibyo and Wiratni Budhijanto	Kinetics of Anaerobic Digestion of Palm Oil Mill Effluent (POME) in Double Stage Batch Reactor with Recirculation and Fluidization of Microbial Immobilization Media	Gadjah Mada University, Indonesia	11.30-11.45
7	401	BIO2 - 7	Wiratni Budhijanto, Hanifrahmawan Sudibyo and Sholahuddin Al Ayyubi	Evaluation of a Pilot-Scale Anaerobic Fluidized Bed Reactor for Landfill Leachate Treatment during Start-Up Period	Gadjah Mada University, Indonesia	11.45-12.00

BIO 3						
Tuesday, July 26, 2017 14.00-15.30 **Lotus Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	416	BIO3 - 1	Danti Firda Nur, Nadia Tuada Afnan, Heri Hermansyah, Tania Surya Utami, Muhamad Sahlan and Anondho Wijanarko	Production Biopesticide Based On Sisteine Protease From Latex and Piece of Papaya (Carica Papaya) for Spodoptera Litura in Red Chilli Pepper (Capsicum Annum)	Universitas Indonesia, Indonesia	14.00 -14.15
2	634	BIO3 - 2	Seffiani, Heri Hermansyah, Anondho Wijanarko, Etin Rohmatin and Muhamad Sahlan	Identification and Classification of Honey's Authenticity by ATR- FTIR Spectroscopy and Chemometric Method	Universitas Indonesia, Indonesia	14.15-14.30
3	654	BIO3 - 3	Muhammad Mufti Azis, Hanifrahwaman Sudibyo and Wiratni Budhijanto	Modeling lab-sized Anaerobic Fluidized Bed Reactor (AFRB) for Palm Oil Mill Effluent (POME) Treatment: from Batch to Continuous Reactors	Gadjah Mada University, Indonesia	14.30-14.45
4	185	BIO3 - 4	Dewi Tristantini and Clarissa Ancella	Antihypertension Activity Test of Antiatherosclerosis Herbs by In Vivo Method	Universitas Indonesia, Indonesia	14.45 - 15.00
5	702	BIO3 - 5	Atikah Ridhowati, Heri Hermansyah, Anondho Wijanarko and Muhamad Sahlan	Making Hard Candy Containing Honey as a Nutrient-Rich Food Product	Universitas Indonesia, Indonesia	15.00-15.15
6	721	BIO3 - 6	Rita Arbianti, Tania Surya Utami and Vifki Leondo	Effect of Biofilm and Selective Mixed Culture on Microbial Fuel Cell for the Treatment of Tempeh Industrial Wastewater	Universitas Indonesia, Indonesia	15.15-15.30

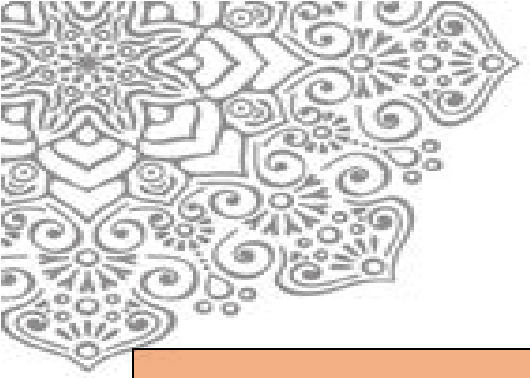
BIO 4						
Tuesday, July 26, 2017 15.45-18.00 **Lotus Room 3rd fl**						
No	Paper #	ID	Author	Title	Affiliation	Time
1	394	BIO4 - 1	Jabosar Panjaitan, Dewi Tristantini, Rizal Alamsyah and Misri Gozan	Reactor Design For Levulinic Acid Production From Palm Oil Empty Fruit Bunches	Universitas Indonesia, Indonesia	15.45-16.00
2	322	BIO4 - 2	Diding Suhandy and Meinilwita Yulia	Discrimination of Several Indonesian Specialty Coffees Using Fluorescence Spectroscopy Combined with SIMCA Method	Lampung University, Indonesia	16.00-16.15
3	502	BIO4 - 3	Ria Wulansarie, Wara Dyah Pita Rengga and Rustamadji Rustamadji	Ozone Technology for Pathogenic Bacteria of Shrimp (Vibrio sp.) Disinfection	State University of Semarang, Indonesia	16.15-16.30
4	520	BIO4 - 4	Yessica Hannauli S, Tania Surya Utami, Ambar Maresya, Muhamad Sahlan, Anondho Wijanarko and Heri Hermansyah	Lipase Biocatalyst Immobilization from Solid State Fermentation of Palm Oil Empty Fruit Bunches, Bagasse, and Palm Oil Sludge with Adsorption-Cross Linking Method in Anion Macroporous Resin	Universitas Indonesia, Indonesia	16.30-16.45
5	116	BIO4 - 5	Whika Febria Dewatisari and Rosalita Agustini	Phytochemicals Screening, Antioxidant Activities, Total Phenolic and Flavonoids content of Sansevieria trifasciata and Sansevieria cylindrica	Indonesia Open University, Indonesia	16.45 - 17.00
6	464	BIO4 - 6	Pratiwi Puji Lestari, Aswati Mindaryani and Sang Kompiang Wirawan	CO2 Absorption from Biogas by Glycerol: Conducted in Semi-batch Bubble Column	Universitas Indonesia, Indonesia	17.00-17.15
7	487	BIO4 - 7	Abdullah Abdullah and Siti Maftukhah	The Effect of Fermentation Time, Moisture Content, and the Type of Substrate in Cellulase Production by Aspergillus niger ITBCC L74 using Solid State Fermentation	Diponegoro University, Indonesia	17.15 - 17.30
8	501	BIO4 - 8	Wara Dyah Pita Rengga, Echa Cahya Julyta Putri, Ria Wulansarie and Agus Suryanto	Ozone Disinfection of Vibrio vulnificus in Shrimp Pond Water	State University of Semarang, Indonesia	17.30 - 17.45

6th IEEE ICALT'2017 - Program at a Glance

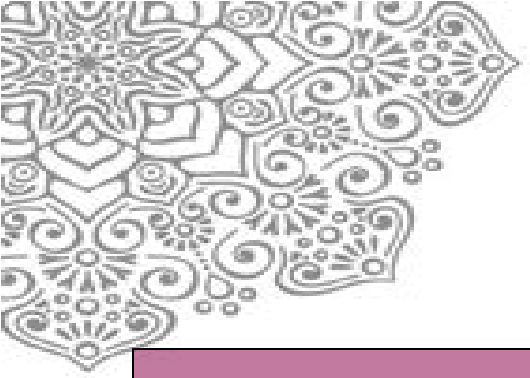
June 24-27, 2017, Bali– Indonesia

The Westin Resort Nusa Dua, Bali

	24 July 2017	25 July 2017	26 July 2017		27 July 2017
08:00-08:30		Registration			
08:30-09:00		Opening Ceremony	**ICALT Tutorial : Prof Aref Maalej**		
09:00-09:30					
09:30-10:00					
10:00-10:30		Coffe break---- Poster Session	Coffe break ---- Poster Session	Coffe break ---- Poster Session	
10:30-11:00		**Plenary Lecture 1: Prof. Benyamin Kusumoputro** **Plenary Lecture 2: Prof. Thomas Goldsby**	QIR SESSION	QIR SESSION	
11:00-11:30					
11:30-12:00					
12:00-12:30		Lunch---- Poster Session	Lunch ---- Poster Session	Lunch ---- Poster Session	
12:30-13:00					
13:00-13:30		QIR SESSION	**ICALT SESSION 1 -OLC**	**ICALT SESSION 2 - EI**	
13:30-14:00					
14:00-14:30					
14:30-15:00					
15:00-15:30	Registration	Coffe break---- Poster Session	Coffe break---- Poster Session	Coffe break---- Poster Session	
15:30-16:00		QIR SESSION	**ICALT SESSION 3- ITS**	**ICALT SESSION 4-LSCM**	
16:00-16:30					
16:30-17:00					
17:00-17:30					
17:30-18:00					
18:00-18:30		Poster Session	Poster Session	Poster Session	
18:30-19:00					
19:00-21:00			Closing Ceremony		



IEEE ICALT'2017 session details						
	id	Title	Authors	Organization	Country	Date
ICALT SESSION 1 (01.00-03.00 pm) (Room 1)-OLC						
Co-Chairs : Hakim Artiba (University of Valenciennes, France) & Cindy Priadi (University of Indonesia, Indonesia)						
01.00 pm	OLC45	Multi-Criteria Decision Making framework for selecting distribution strategy in E-Commerce	Sumit Sakhuja, Giuseppe Timperio, **Lindawati** and Robert de Souza	National University of Singapore	Singapore	26/07/2017
01.15 pm	QR106	The Effectiveness of Pilot Marine Transport Services for Goods Distribution in Maluku Island Group, Indonesia	**Windra Priatna Humang,** Sigit Pranowo Hadiwardoyo and Nachry Yusuf	University of Indonesia	Indonesia	
01.30 pm	OLC30	Cooperative Tabu Search for NP-Hard Combinatorial Problems: Application to the Traveling Salesman Problem and the Integrated Problem of Location Assisgnment and Straddle carrier Scheduling	**Hamdi Dkhil**, Adnan Yassine and Habib Chabchoub	University of le Havre	France	
01.45 pm	QR216	The Hybrid Clustering Heuristic Approaches to Solve Capacitated Facility Location Problem	Gerard Randi Sutanto, Sunho Kim and **Hadi Sutanto**	University of Indonesia	Indonesia	
02.00 pm	QR228	The Layout Optimization of Production Process Facilities in Apple Processing to Improve Productivity and Sustainability SMEs	**Debrina Puspita Andriani,** Muhammad Hafid Zamroni, Tiffany Clara Alesi and Fajri Rahman	University of Indonesia	Indonesia	
02.15 pm	OLC 6	Impact of modal shift of container transportation from Urban Highways: In the context of Colombo metropolitan	**Punthila Erandi Jayarathne**	University of Moratuwa	Sri Lanka	
02.30 pm	QR415	Container Ship Accident Analysis Due To Container Stacked On Deck As An Attempt To Improve Maritime Logistic System	**Gafero Rahim** and Sunaryo Sunaryo	University of Indonesia	Indonesia	
02.45 pm	OLC46	Stakeholders' Needs and Requirements from a Decision Support System for Staff Scheduling in the Road Transportation of Crude Oil Sector	**Koubaa Mayssa**, Souhail Dhouib and Abderrahman El Mhamedi	University of Paris 8	France	
ICALT SESSION 2 (01.00-03.00 pm) (Room 2)-EI						
Co-Chairs : Aref Maalej (University of Paris 8, France) & Komar Udin (University of Indonesia, Indonesia)						
01.00 pm	QR26	The Implementation of Wash, Rinse, and Spin Technique in Accelerometer's Data Processing on Android Smartphone to Generate Stream Keys	**Danila Machmud** and Dion Ogi	University of Indonesia	Indonesia	26/07/2017
01.15 pm	QR57	Study Trends and Challenges of the Development of Microgrids	**Heri Suyanto a**nd Rina Irawati	University of Indonesia	Indonesia	
01.30 pm	QR161	Review on The Development of Ride Sharing System Using Online Transportation Service in Jakarta	**Helen Burhan**, Sutanto Soehodho and Nahry Yusuf	University of Indonesia	Indonesia	
01.45 pm	IE28	The Development of Sustainability Strategic Management Assessment Tool (From a Systematic Literature Review to a Conceptual Framework)	Yenny Sari and **Akhmad Hidayatno**	University of Indonesia	Indonesia	
02.00 pm	IE32	Simulating impacts of regulatory policies on urban freight: application to the catering setting	**Sarra Jlassi,** Simon Tamayo, Arthur Gaudron and Arnaud De La Fortelle	MINES ParisTech	France	
02.15 pm	IE41	Importance of Handling Resources' Incorporation Into Simulation Expert System Approach	**Imen Lajmi,** Wassim Masmoudi and Mounir Elleuch	University of Sfax	Tunisia	
02.30 pm	QR131	Reducing MSDS Using Anthropometric Design at Small and Medium Printing Enterprise	**Meilita Tryana Sembiring**, Irwan Budiman and Yusuf Hanifiah	University of Indonesia	Indonesia	
02.45 pm	IE8	Supply chain improvement in LARG (Lean, Agile, Resilient, Green) context: A Risk Management Approach	**Rachid Benmoussa**	University of University Cadi Ayyad	Morocco	
03.00 pm	IE18	Elaboration of Risk Mitigation Strategies based on Sustainable Development Practices	**Manel Elmsalmi,** Hayfa Khlifi and Wafik Hachicha	University of Sfax	Tunisia	



ICALT SESSION 3 (03.30-06.00 pm) (Room 1) ITS						
Co-Chairs : Bertrand David (Ecole Centrale de Lyon, France) & Rachida Benmoussa (University of University Cadi Ayyad, Morocco)						
03.30 pm	ITS 1	Acquisition of Automated Guided Vehicle Route Planning Policy Using Deep Reinforcement Learning	**Ryota Kamoshida** and Yoriko Kazama	Hitachi, Ltd.	Japan	26/07/2017
03.45 pm	ITS2	Optimizing V2X Data Collection and Storage for a Better Cost and Quality Trade-off	**Mohamed Ben Brahim and Hamid Menouar**	Qatar Mobility Innovations Center	Qatar	
04.00 pm	ITS3	Robust Operation of Autonomous Logistics Vehicles in Intelligent Warehouse	Boc Minh Hung, **Sam-Sang You,** Hwang-Seong Kim and Bui Duc Hong Phuc	Korea Maritime and Ocean University	South Korea	
04.15 pm	ITS13	A Pool-based Recursive Construction Approach for Logistics Route Planning with Time Window	Ya-Wen Yang and **Hsueh-Chan Lu**	National Cheng Kung University	Taiwan	
04.30 pm	ITS31	Fresh and Frozen Foods Lockers as part of Market, e-Market and Collaborative Economy Smart City Environment: Systemic & logistic point of view	**Bertrand David** and René Chalon	Ecole Centrale de Lyon	France	
04.45 pm	ITS35	Material supply by means of multi-load autonomus robots	Augusto Urru, Marco Bonini and **Wolfgang Echelmeyer**	Reutlingen University	Germany	
05.00 pm	ITS40	On the Design of a Safety Related Middleware DDS Application for Underground Railway Environment	**Seilendria Ardityarama Hadiwardoyo** and Liuhua Gao	Universitat Politecnica de Valencia	Spain	
05.15 pm	QR830	Vehicle Detection using Dimensionality Reduction based on Deep Belief Network for Intelligent Transportation System	Dewa Made Sri Arsa, Grafika Jati and Wisnu Jatmiko	University of Indonesia	Indonesia	
05.30 pm	ITS33	Big Data for Operational Efficiency of Transport and Logistics : A Review	Tawfik Borgi, Nesrine Zoghlami, Mourad Abed and Mohamed Saber Naceur	University of le Havre	France	
ICALT SESSION 4 (03.30-06.00 pm) (Room 2) LSCM						
Co-Chairs :Thomas J. Goldsby (Fisher College of Business, USA) & Tri Tjahiono (University of Indonesia, Indonesia)						
03.30 pm	LSCM3	Finding an Optimal Assignment of Berths Containers to Storage Areas in port Terminals Formulation, Complexity and Case Study	**Lobna Kallel,** Hichem Kamoun, Mounir Benaissa and Abdellatif Benabdelhafid	University of Sfax	Tunisia	26/07/2017
03.45 pm	LSCM11	Load and drive method for cargo securing on commercial vehicles	**Marc Juwet** and Niek Cherlet	KU Leuven	Belgium	
04.00 pm	LSCM16	Forecasting Supply in Voronoi Regions for App-Based Taxi Hailing Services	**Ravina Gelda,** Krishna Jagannathan and Gaurav Raina	Indian Institute of Technology Madras	India	
04.15 pm	LSCM22	Contemporary Issues in The Indonesian Fish Logistics	Danang Parikesit, **Hafida Fahmiasari** and Setijadi	The World Bank	Indonesia	
04.30 pm	LSCM23	Estimation of Travel Time Variability Using Bus Probe Data	**As Mansur** and Tsunenori Mine	Kyushu University	Japan	
04.45 pm	LSCM26	Tourism Mobile Recommender Systems: A Survey	**Indri Hapsari** and Isti Surjandari	University of Indonesia	Indonesia	
05.00 pm	LSCM27	Airline Cargo Alliance and Allied Flight Frequency Analysis using the Fuzzy Cooperative Game and Flight Frequency Programming	**Yuh-Horng Wen**	Tamkang University	Taiwan	
05.15 pm	LSCM39	Utilizing Excess Capacity in Last Mile Using 4th Party Milk Run	Cher Kian Lee, **Lindawati Lindawati** and Robert de Souza	National University of Singapore	Singapore	
05.30 pm	QR26	Model of Governance Management and Port Performance Improvement Strategies in Indonesia	**Sirajuddin,** T. Yuri Zagloel and Sunaryo	University of Indonesia	Indonesia	
05.45 pm	LSCM14	A typology of dashboard for a territorial industrial ecosystem	Ebtissem Sassi, **Abdellatif Benabdelhafid** and Sami Hammami	University of le Havre	France	

Poster Session Day 1

Tuesday, July 25, 2017 15.00-15.30

No	ID	Paper #	Author	Title	Afiliation
1	P - 1	30	Heri Suyanto, Albert Gifson and Juara Mangapul	Analysis Study of Rate Total Harmonic Distortion (THD) at Substation - Substation Distribution Industry Customers, Business and Household	PLN Technical College, Indonesia
2	P - 2	328	Peter Chondro, Shanq-Jang Ruan and Chia-Hua Chang	Entropy-Based Analysis on Dynamic Video Dimming Algorithm for Energy Efficient OLED Displays	National Taiwan University of Science and Technology, Taiwan
3	P - 3	345	Daniel Hofman, Jenq-Shiou Leu and Pavel Troller	Evolution from a Door Bell into an IP Door Phone	National Taiwan University of Science and Technology, Taiwan
4	P - 4	396	Hindarto Hindarto and Sumarno Sumarno	Feature Extraction of Epilepsy Signal Using Sampling Technique	Muhammadiyah University of Sidoarjo, Indonesia
5	P - 5	408	Amalia, Erfan Rohadi and Indrazno Siradjuddin	Numerical Analysis of the Bandwidth Enhancement of an Inverted F Antenna for UHF Channel at 639 MHz	State Polytechnic of Malang, Indonesia
6	P - 6	409	Ferrianto Gozali and William Kristianto	The Utilization Of Quick Response Code In E – Payment To Support Retail Business Transaction	Trisakti University, Indonesia
	P - 7	454	Indrazno Siradjuddin, Rendi Pambudi Wicaksono, Anggit Murdani, Zakiyah Amalia and Denda Dewatama	State of the Art of Joint Torque Sensor for Human Robot Interaction	State Polytechnic of Malang, Indonesia

8	P - 8	474	Jeong-Hoon Seol and Sung-Ho Hahm	Drain Current Modeling of GaN Schottky Barrier MOSFETs	Kyungpook National University, South Korea
9	P - 10	573	Chin-Hsien Wu and Ting-Wei Wang	A Garbage Collection Management Method for Reliable Non-Volatile Memory Systems	National Taiwan University of Science and Technology, Taiwan
10	P - 11	748	Lesti Setianingrum and Sasono Rahardjo	LiFi as an Emerging Technology to be Utilized in Indonesia	Agency for The Assessment and Application of Technology (BPPT), Indonesia
13	P - 13	15	Anton Irawan, Dina Nur Izzati and Rahajeng Widiana Purwaningrum	Investigation Anti Slagging Materials for Increasing Ash Fusion Temperature (AFT) in Pulverized Coal Combustion	Sultan Ageng Tirtayasa University, Indonesia
14	P - 14	45	Sri Atmaja P. Rosyidi, Siegfried Siegfried and Nur Izzi Md Yusoff	Evaluation of Seismic Tests for Pavement Assessment in Indonesia	Muhammadiyah University of Yogyakarta, Indonesia
15	P - 15	100	Anthony Christian, Sheila Tobing and Riccy Kurniawan	A Numerical Analysis on the Effects of Angle-of-Attack and Stagger on the Propulsion of Tandem Airfoil at High and Low Speed Flight	Atma Jaya Catholic University, Indonesia

Poster Session Day 1					
Tuesday, July 25, 2017 18.00-19.00					
No	ID	Paper #	Author	Title	Afiliation
1	P - 16	175	Aprilinda Sofiana, Leonardo Chandra, Ismojo and Aniek Sri Handayani	Manufacturing Micro/Nano-Fiber Cellulose as Bio-Composite Filler from Sorghum Stalk Waste for Automotive Component Application	Indonesia Institute of Technology, Indonesia
2	P - 17	233	Mohammed Ali Berawi, Perdana Miraj, Abdur Rohim Boy Berawi and Revaldo Agdhitya	Developing urban planning in new city of Walini: Creating benefits from high speed train project	Universitas Indonesia, Indonesia
3	P - 18	261	Kamarza Mulia, Fitria Hasanah and Elsa Krisanti	The Effect of Heating Temperature on Cytotoxicity and Alpha-Mangostin Yield: Fresh Mangosteen Pericarp Juice and Mangosteen Extract	Universitas Indonesia, Indonesia
4	P - 19	304	Fitri Khoerunnisa, Hendrawan Hendrawan, Dwi Rizki Primastari and Riska Agiawati	Effect of MWCNT on Properties and Flux of Chitosan/PEG Based Ultrafiltration Membranes	Indonesia University of Education, Indonesia
5	P - 20	383	Khairul Hadi B, Made Tri Ari Penia Kresnowati and Tjandra Setiadi	Optimization of Crude Xylanase Production from Oil Palm Empty Fruit Bunches	Bandung Institute of Technology, Indonesia
6	P - 21	398	Fathya Rahmina, M.T.A.P Kresnowati and Yazid Bindar	Development of Instant Starter for Fermented Cassava Flour Production	Bandung Institute of Technology, Indonesia
7	P - 22	420	Siswo Sumardiono, Isti Pudjihastuti, Anggun Siswanto and Edy Supriyo	Advanced Oxidation Process via Ozonation of Cassava Starch for Psychochemical and Rheological Properties Enhancement	Diponegoro University, Indonesia

8	P - 23	421	Anggun Siswanto, Wahyuningsih and Isti Pudjihastuti	Enzymatic Synthesis of Tuna Oil and Lauric Acid for Modified Lipid Production Using Lipase Candida Rugora as Biocatalyst	Diponegoro University, Indonesia
9	P - 24	437	Yuliusman Yuliusman, Nasruddin Nasruddin, Alristo Sanal, Andra Barnama, Farandy Harris and Imam Ramadhan	CFD Modeling of Adsorption Behavior in Adsorbed Natural Gas Tank with Polyethylene Terephthalate Plastic Waste Based Activated Carbon	Universitas Indonesia, Indonesia
10	P - 25	458	Tuty Emilia Agustina, Gita Theodora Simanjuntak and Tessa Rebecca	Application of Fenton-Based Methods for the Treatment of Traditional Fabric Wastewater	Sriwijaya University, Indonesia
11	P - 26	461	Yuliusman Yuliusman, Nasruddin Nasruddin, Muhammadl Afdhol, Rahmatika Amiliana, Afdhal Hanafi and Imam Ramadhan	Off Gas Purification of Crude Oil Refinery Using Activated Carbon from Coconut Shell Oil as Biosorbent	Universitas Indonesia, Indonesia
12	P - 27	491	Winarto Winarto, Rini Riastuti and Nur Kumeidi	Microstructural and Mechanical Properties of Welded High Strength Steel Plate Using SMAW and SAW Method for LPG Storage Tanks	Universitas Indonesia, Indonesia
13	P - 28	524	Elsa Ramayeni, Dimas Firlyansyah Pratama and Bambang Heru Susanto	Synthesis of Partially Hydrogenation of Kemiri Sunan Biodiesel (H-FAME) using NiMo/Carbon Catalyst to Increase Oxidation Stability of Biosolar	Universitas Indonesia, Indonesia
14	P - 29	525	Dimas F. Pratama and Bambang Heru Susanto	Application of Modified Microwave Polyol Process Method on NiMo/C Nanoparticle Catalyst Synthesis for Hydrogenated Biodiesel Production	Universitas Indonesia, Indonesia

15	P - 30	563	Yusuf Latief, Mohammed Ali Berawi, Ario Bintang Koesalamwardi, Leni Sagita Riantini, Jade Sjafrecia Petroceany	Defining Design Parameters for Housing Development in Tropical Climate using Near Zero Energy House (NZEH) Concept	Universitas Indonesia, Indonesia
16	P - 12	142	Edvins Dauksta, Pavels Onufrijevs, Masaru Shimomura, Vygantas Mizeikis, Arturs Medvids and Kenji Murakami	Modification of TiO2 Single Crystal by Laser Radiation	Shizuoka University, Japan
17	P - 9	675	Daniel Moraru, Gaurang Prabhudesai, Mitsuki Shibuya and Michiharu Tabe	Impact of Dopant-Atoms in Inter-band Tunneling in Si Nanoscale Tunnel Diodes	Shizuoka University, Japan

Poster Session Day 2					
Wednesday, July 25, 2017 10.00-10.30					
No	ID	Paper #	Author	Title	Afiliation
1	P - 31	579	Isti Pudjihastuti, Siswo Sumardiono and Noer Abyor Handayani	Physicochemical Characteristics of Artificial Rice from Composite Flour: Modified Cassava Starch, Canavalia ensiformis and Dioscorea esculenta	Diponegoro University, Indonesia
2	P - 32	594	Agung Sri Hendarsa	Photo-Bio-Degradation of Phenol Using Composite TiO2-pumice and Composite Biofilm Acinetobacter baumanii-pumice	Universitas Indonesia, Indonesia
3	P - 33	596	Teguh Endah Saraswati, Kartiko Nugroho and Miftahul Anwar	Formation of Carbon-based Composite Anti Corrosion Coating Layer Using Flame Thermal Spray DepositionFormation of Carbide-based Composite Anti-Corrosion Coating Layer Using Flame Thermal Spray Deposition	Sebelas Maret University, Indonesia
4	P - 34	620	Denni Sari, Indar Kustiningsih and Utami Lusi	Ultrasonic-Assisted Extraction of Total Phenolic Coumpounds from Ketapang Leaves (Terminalia Catappa)	Sultan Ageng Tirtayasa University, Indonesia
5	P - 35	629	Agung Sri Hendarsa	Biodegradation of Methylcyclohexane (MCH) Using Composite Biofilm Acinetobacter Baumanii-Pumice Stone	Universitas Indonesia, Indonesia

6	P - 36	630	Risya Utaviani, Dimas Farlyansyah and Bambang Heru Susanto	Synthesis of Green Diesel Through Hydrolysis and Hydrodeoxygenation from Waste Cooking Palm Oil Using NiMo/Al2O3 Catalyst	Universitas Indonesia, Indonesia
7	P - 37	659	Mukti Andriyanto	Trash as a Hub of Scavanger's Money	Universitas Indonesia, Indonesia
8	P - 38	668	Rina Dewi Mayasari	Effect of Different Substrates on Synthesis and Growth of ZnO Rods	Agency for the Assessment and Application of Technology (BPPT), Indonesia
9	P - 39	673	Desi Heltina, Praswasti Pdk Wulan and Slamet Slamet	Influence of the Zeta Potential on the Dispersability of Carbon Nanotube	Universitas Indonesia, Indonesia
10	P - 40	704	Apri Wiyono, Titi Puspita, Cindy Rianti and Adi Surjosatyo	Effect of Ratio Organic Compounds and Particle Size to Pellet Performance - Pelletizing Combination of MSW and Biomass Feedstocks	Universitas Indonesia, Indonesia
11	P - 41	711	Dieni Mansur, Muhammad Arifuddin Fitriady and Sabar Pangihutan Simanungkalit	Liquefaction of Waste Plastics as a New Method for Fuel Production and Its Upgrading Over Volcanic Ash	Indonesian Institute of Sciences (LIPI), Indonesia

12	P - 42	729	Rudy Ariyanto, Erfan Rohadi, Rosa Andrie Asmara, Imam Fahrurrozi and Nugroho Suharto	The Development and Analysis of a Decision Support System for Student Tuition Fee Policy at Malang State Polytechnic using Multi-Objective Optimization by Ratio Analysis (MOORA) Method	State Polytechnic of Malang, Indonesia
13	P - 43	740	Asep Handaya Saputra and Nadia Huda Apriliana	Polyvinyl Alcohol (PVA) Partially Hydrolyzed Addition in Synthesis of Natural Hydrogel Carboxymethyl Cellulose (CMC) Based from Water Hyancinth	Universitas Indonesia, Indonesia
14	P - 44	764	Kamarza Mulia, Elsa Krisanti and Gitasha A. Putri	Encapsulation of Mangosteen Extract in Virgin Coconut Oil Based Nanomulsions: Preparation and Characterization for Topical Formulation	Universitas Indonesia, Indonesia
15	P - 45	777	Cindy Rianti Priadi, Evelyn Suleeman, Linda Darmajanti, Shanty Novriaty, Nyoman Suwartha, Rina Resnawati, Gita Lestari Putri, Elzavira Felaza and Tri Tjahjono	Water Recycling Opportunity in Business Sector in Greater Jakarta Region, Indonesia	Universitas Indonesia, Indonesia
16	P - 46	785	Dhoni Hartanto, Waliyuddin Sammadikun, Akhmad Sutrisno, Abdul Basit and Ade Surya Siladryanto	Optimization of CaO + H2O Reaction, Cooling Bath NaCl/Ice and Sodium Thiosulfate Clock Reaction in the Prototype of Chem-E-Car SMARTTRONS	State University of Semarang, Indonesia

Poster Session Day 2

Wednesday, July 25, 2017 12.00-13.00

No	ID	Paper #	Author	Title	Afiliation
1	P - 47	795	Witri Wahyu Lestari, Riandy Putra and Bambang Heru Susanto	Green Diesel Production from Palm Oil Using Klaten's Natural Zeolite Modified with Fe Metal Nanoparticle as Heterogeneous Catalyst	Sebelas Maret University, Indonesia
2	P - 48	806	Muhamad Sahlan, Nelson Saksono and Jeffry Lesmana	Urban Bee Concept	Universitas Indonesia, Indonesia
3	P - 49	835	Yuswan Muharam, Lisa Marie Zulkarnain and Nurania Saubryania	Modeling of a Fixed-Bed Reactor Integrated with Distillation Columns for Methanol Dehydration to Produce Dimethyl Ether	Universitas Indonesia, Indonesia
4	P - 50	836	Yuswan Muharam and Aditya Kurniawan	Application of Computational Fluid Dynamic for Non-geometric Scale-up of Stirrer Batch Reactor for Crude Palm Oil Degumming Process	Universitas Indonesia, Indonesia
5	P - 51	843	Sri Hastutya, Hideki Katayama, Eiji Tada and Atsushi Nishikata	Electrochemical Impedance Spectroscopy Characterization of Passive Film of Stainless Steels	Pertamina University, Indonesia
6	P - 52	848	Sri Harjanto, Dede R. Kurnia, Jaka Fajar and Bambang Priyono	Structural Properties of Lithium Titanium Oxides Synthesized from LiOH and TiO2 by Solid State Process	Universitas Indonesia, Indonesia

7	P - 53	851	Nelson Saksono, Danar Aditya, Jeremia Jan and Setijo Bismo	Synthesis of Biodiesel Using CPO by Contact Glow Discharge Electrolysis	Universitas Indonesia, Indonesia
8	P - 54	865	Zakaria Jaka Bahari, Eny Kusrini, Sri Harjanto and Nici Trisko	Extraction of Rare-Earth Elements Using Mechanical and Chemical Processes with Oxalic Acid	Universitas Indonesia, Indonesia
9	P - 55	872	Nici Trisko, Eny Kusrini, Sri Harjanto and Zakaria Jaka Bahari	Separation of Lanthanides from Low Grade Bauxite	Universitas Indonesia, Indonesia
10	P - 56	899	Kyungjin Bae, Ting Chen, Dongan Cha and Ohkyung Kwon	Experimental Investigation on the Heat Transfer Characteristics of Zeilite Adsorbent Coated Fin-Tube Heat Exchanger	Korea Institute of Industrial Technology, South Korea
11	P - 57	908	Kamarza Mulia, Andrie and Elsa Krisanti	Effect of Sodium Tripolyphosphate Concentration and Simulated Gastrointestinal Fluids on Release Profile of Paracetamol from Chitosan Microspheres	Universitas Indonesia, Indonesia
12	P - 58	913	Sunaryo, Pradhana S Imfianto, Aldy Syahrihaddin Hanifa	Investigation on the Hull Material for Solar Powered Electrical Sport Boat	Universitas Indonesia, Indonesia
13	P - 59	919	Siswo Sumardiono, Isti Pudjihastuti and Noer Abyor Handayani	The Quality of Analog Rice from Composite Flour: Modified Cassava Flour, Canavalia ensiformis and Dioscorea esculenta Using Hot Extrusion	Diponegoro University, Indonesia

14	P - 60	926	Maya Lestari, Supriyadi Supriyadi, Sholahudin Sholahudin and Nasruddin Nasruddin	Optimization Study of (0,12), (0,15), and (0,18) SWCNT's Chirality on Ideal Pressure Hydrogen Gas Storage: The Implementation of Neural Network Configuration	Universitas Indonesia, Indonesia
15	P - 61	928	Eny Kusrini, Angga Kurniawan Sasongko, Nasruddin Nasruddin, Chairani Shafira Utami and Atik Suhrowati	Synthesis of Graphite-Magnetic Nanoparticles Fe_3O_4 and Its Application as Adsorbent for Carbon Dioxide Gas	Universitas Indonesia, Indonesia
16	P - 62	930	Eny Kusrini, C S Utami, Nasruddin Nasruddin, A Suhrowati and A S Kurniawan	Synthesis and Characterization of Graphite Waste with CeO_2 Using Mechanically, Thermal and Chemically Methods	Universitas Indonesia, Indonesia

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CE

CE1A - 1

Enchancing Removal Efficiency of Ammonia and Nitrate in Shrimp Farm Wastewater Using Biofloc Technology and Effective Microorganisms 4 (EM4)

Nyoman Suwartha[1,*], Dian Rahayu Pujiastuti[1]

[1]*Environmental Engineering Study Program, Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI depok, Depok 16424, Indonesia*

Shrimp farms generates wastewater which contain high concentration of ammonia and nitrate produced from feed residue and shrimp secretion. This study aimed to analyse concentration changes of ammonia and nitrate in shrimp farm wastewater by applying Biofloc Technology (BFT) combine with *Effective Microorganisms 4* (EM4), and to determine the optimum concentration of EM4 in reducing ammonia and nitrate concentration. Experiment was carried out for 30 days in laboratory scale using three treatment tanks sized of 40x25x30 cm^3. Each tanks equiped with aerator 7 L/min and lamp 30 watts contains different EM4 concentration: 3 ml/l; 5 ml/l; and 7 ml/l, 15 liters of fresh water, and 20 young shrimps. By the end of observation in all three treatment tanks, water parameter such as DO was recorded in ranged between 4.11-4.48 mg/l, pH 7.7-8.4, and temperature 29.1-30.7ºC. Nutrients level include ammonia and nitrate were in good condition with the maximum removal of ammonia concentration from each treatment tank for EM4 3 ml/l, 5 ml/l, and 7 ml/l were 74.1%, 84.2%, and 88.9%, whereas for nitrate were 68.4%, 72.6%, and 83.7%, respectively. Ammonia and nitrate concentration were successfuly reduced to about 0.634 mg/l and 1.261 mg/l, respectively. Dosage EM4 of 7 ml/l was considered as the optimum concentration in reducing ammonia and nitrate concentration. It can beconcluded taht combination of biofloc technology and EM4 is succesfully work in removing ammonia and nitrate wasted in shrimp farm wastewater and maintain the nutrients and water quality in the safety level so that potential to be used as water recycle for shrimp aquaculture.

Keywords:

Ammonia; Biofloc technology; EM4; Nitrate; Shrimp farm wastewater

CE1A - 2

Partial Phase I Environmental Site Assesment of Piyungan Landfill and Anaerobic Fliuized Bed Reactor (AFBR) Pilot Study for Leachate Treatment

Christina Browning[a,1], Sholahudin Al Ayyubi[b], and Wiratni Budhijanto[b,2]

[a]*Environment and Resource Management Department, Arizona State University, United State of America*
[b]*Chemical Engineering Department, Faculty of Engineering, Universitas Gadjah Mada, Jl. Grafika 2 Yogyakarta 55281 Indonesia*
[b]*Center for Energy Studies, Universitas Gadjah Mada, Sekip K-1A Yogyakarta 55281 Indonesia*

An abbreviated Phase I Environmental Site Assessment was performed to identify areas of potential contamination within the leachate management system at Piyungan landfill in Yogyakarta and to evaluate the mitigating effects of an Anaerobic Fluidized Bed Reactor (AFBR) pilot study on the recognized environmental conditions. The AFBR pilot system was found to reduce the quantity and hazardous components of the Piyungan leachate thus reducing the landfill's negative impact on surface waters and air emissions. The AFBR pilot system allows more quantities of high-organic content leachate to reach the methanogenic phase of decomposition in a shorter amount of time than in the naturally occurring process of untreated leachate, preventing the production of organic acids, alcohols, methane and nitrogen which can cause an adverse effect on vegetation, animal species and humans when exposed to unnatural levels of these compounds. The AFBR system is also effective in reducing methane emissions; a significant result due to the high global warming potential of this gas. However, these mitigation efforts are limited in the pilot system's current state. In order to have a more effectively alleviate the recognized environmental conditions (RECs) on site, the AFBR system would require scale up and calibration to reach maximum efficacy with additional treatment systems for hazardous non-organic contaminants.

Keywords:

Phase I Environmental Site Assessment, Leachate Treatment, Anaerobic Treatment of Leachate, Anaerobic Fluidized Bed Reactor, Municipal Solid Waste Landfill Environmental Impact

CE1A - 3

Leachate Treatment Using Three Years Aged Lysimetric Bioreactor Models

Djoko M. Hartono [a]*, Gabriel Andari Kristanto [a], Irma Gusniani Sofian [a], Ahmad Fauzan [a]

[a]*Department of Civil Engineering, Environmental Engineering Study Programme, Faculty of Engineering, Universitas Indonesia, Kampus Universitas Indonesia, 16424, INDONESIA*

This study was conducted as a response to address the problem of land availability for Cipayung landfill that no longer able to accommodate waste generation Depok City and to protect water pollution in receiving water body. Law No. 8/2008 explained that local governments and cities are required to create a sanitary landfill as a final waste processing system to replace open dumping that had been done by almost all the final processing of waste in cities in Indonesia. Sanitary landfill is the final waste processing system that works best and is environmentally friendly. The sanitary landfill will generate leachate. Leachate is the result of precipitation, evaporation, surface runoff, water infiltration into the waste, and also including the water contained in the waste. The purpose of this study was to determine the utilization of leachate generated by three years aged reactor. This study use a modeling tools as bioreactor landfill tank or so called lysimetric, that made of the polymer material that susceptible to high heat and pressure. This bioreactor landfill tank has a diameter of 0.83 m, with a surface area of 0.54 m^2 and a height of 2.02 m, with the examination duration of 115 days. This tank consists of several layer, such as sand layer, solid waste layer, water layer and piping system. These layer has 3 year aged.The In this research, leachate recirculation in bioreactor landfills was conducted with waste layered loading systems with percolation system. This research has been conducted since the beginning of 2016, sampling, field measurement and analysis of leachate and waste quality carried out for approximately 115 days of field measurements. Several parameter were measured such as pH, BOD, COD, nitrate, nitrite and TSS. From the analysis of the leachate quality parameters of pH, BOD, COD, nitrite, TSS, showed a reduction in the concentration of the three reactors. The concentration of parameters measured at the initial stage until the final stage, showed a reduction in the concentration of the parameters, even reaching 90% reduction for BOD (biological oxygen demand), COD, (chemical oxygen demand) nitrite, and TSS (total solid suspended) parameters. So it can be concluded that the recirculation of leachate of the sanitary landfill can reduce the concentration of pollutants in the leachate that will be discharged into water bodies, thereby reducing the pollution of the receiving water body. This research is funding by PUPT Kemristekdikti and DRPM UI.

Keywords:

bioreactor, lysimeter, leachate, sanitary landfill, parameter

CE1A - 4

Effect of Plants *Vetivera Zizaioides* (Akar Wangi) on Performance of Field Plant Subsurface Constructed Wetlands – Multilayer Filtration with Vertical Flow

Ariani Dwi Astuti *) Muhammad Lindu *) Ramadhani Yanidar *) Maria Manda Kleden *)

*ariani_da@trisakti.ac.id *)Department of Environmental Engineering, FALTL, Trisakti University, Jakarta*

Canteen wastewater contains high-organic content that have to be treated before being discharged and not contaminating the water stream. Most of Senior High Schools in DKI Jakarta do not have canteen wastewater treatment plant. Nowdays there are more than 172 Senior High Schools in DKI Jakarta. A subsurface constructed wetland (SCW) field plants were designed, implemented and operated at a Senior High School, in Jakarta Selatan. The type of SCW was multilayer filtration (MLF) type with vertical flow and have successfully been used for the treatment of a real canteen wastewater. The SCW-MLF field plants was operated at a hydrolic load of 6.9 m^3/day and the organic loading rate was 1.43-8.3 kg BOD/day. The SCW-MLF field plants units were planted with *Vetivera zizanioides*. Monitoring and evaluation of the performance of the units were carried out through regular physico-chemical of the inlet and outlet wastewater. The results indicated significant removals of different pollutants in SCW- MLF in terms of COD, BOD, TKN, TP and oil and grease. The removal efficiencies of COD, BOD, TKN, and TP were 70.5%, 75%, 62.6%, and 54.3%. The COD and BOD organic loading at SCW-MLF were 917.08 – 4.126,84 kg COD/Ha/day and 309.78 – 850.73 kg BOD/Ha/day. In order to study the influence of vegetation in TN and TP removal processes, a pilot unit multilayer filtration (MLF) was operated with the same surface hydrolic loading. The removal effciencies of COD, BOD, TKN, and TP were 41.9%, 51.4%, 19.8%, and 36.6% in MLF. The SCW-MLF proved to be more efficient than MLF not only in COD, BOD, oil and grease removals but also for TKN, TP because of the vegetation. In conclusion SCW-MLF is proved to be effective for canteen wastewater treatment due to its function as a garden and high quality effluent that complied with Ministry of Environment and Forestry's Standard for wastewater Nr. P.68/2016 for COD, BOD, and TKN.

Keywords:

Multilayer Filtration, Organic loading, Removal Efficiency, Subsurface Constructed Wetlands, Vegetation

CE1A - 5

Pantura Water Quality: comparing the pollution distribution model of Comal river and Garang river

Adipati R. Gumelar[a], Abimanyu T. Alamsyah[b], Setyo S. Moersidik[c], Rudhy Akhwady[d], Nurfitri Syadiah[e]

[a]*School of Strategic and Global Studies, Universitas Indonesia, Jakarta, Indonesia*
[b]*School of Strategic and Global Studies, Universitas Indonesia, Jakarta, Indonesia*
[c]*School of Environmenal Sciences, Universitas Indonesia, Jakarta, Indonesia*
[d]*Ministry of Marine Affairs and Fisheries, Jakarta, Indonesia*
[e]Ministry of Marine Affairs and Fisheries, Jakarta, Indonesia

Sea is the estuary of rivers on land. In the sea all kind of pollutions carried by the river flow will be accumuated, which make the sea water quality worse than the river itself. Comal river and Garang river is two of the few river that flows into the North Java Coastal. Comal river ends in Pemalang Regency, and Garang river ends in Semarang Municipality. The estuary sea water quality is very important because it concerns the biotic lives that resides on the estuary. A polluted biotic is very dangerous to be consumed, or in a more extrim cases, could cause a mass fatality which in turn could cause a more polluted waters. This study is meant to analyze the pollution load from both rivers, compare its key parameters, and make a pollution distribution model to estimate the pollution impact for each coastals. This study taking water sample from several sample points in both rivers, and analyze it using the QUAL2KW method. This method are used to find out the water quality along the river watersheds, so the Government could establish a pollution management policy for each rivers. There are two result of QUAL2KW method, the first one is pollution load graph for each river, and the second one is the seawater quality in both estuaries. The concentrated pollution load for Comal Estuary are: 16.54 mg/l of Total Suspension Solid, 0.53 mg/l of BOD, 7.74 mg/l of DO, 8.085 mg/l of nitrat, and 2.285 mg/l of Fosfat. As for the concentrated pollution load for Garang are: 2.96 mg/l of Suspension Solid, 23.13 mg/l of BOD, 1.49 mg/l of DO, 3.95 mg/l of nitrat, and 1.7 mg/l of fosfat. The comparison results shows that the maximum concentration of suspension solid, DO, nitrat, and pospat, comes from the Comal river, whereas the maximum concentration of BOD comes from the Garang river.

Keywords:

Pollution load; estuary; QUAL2KW, Comal river, coastal pollution, distribution model

CE1A - 6

Effects of Vegetation Distribution on Experimental Micro-Drainage Channel

Robby Yussac Tallar[a1], Erick Wijaya[a], Reinaldo[a] and Jian-Ping Suen[b]

[a]*Universitas Kristen Maranatha, Jln. Surya Sumantri No. 65, Bandung 40641*
[b]National Cheng Kung University,No. 1 University Road, Tainan 701, Taiwan R.O.C

Waterbodies are facing a diversity of threats in many parts of the world. To restore and preserve waterbodies environments, it is necessary to implement eco-hydraulics concept design into waterbody restoration projects. Eco-hydraulics is an integrated approach that deals with natural ecosystems as well as environmental impacts and mitigation measures. It incorporates species-habitat relationships and interactions of ecological and biological aspects within waterbodies. Physical habitat components including vegetation in the bed channel are considered affected the characteristics of flows in micro-drainage channels. Therefore, this paper aims to evaluate the characteristics of flows in vegetated micro-drainage channel with different scenarios. A laboratory study to explore the effect of vegetation in terms of roughness of vegetation on the hydraulics of flow in 8 m length x 40 cm width a rectangular channel is presented. The study consists of an extensive set of rectangular flume experiments for flows with certain slope and gravel bed with Sirih Gading (Epipremnum aureum) as selected flexible vegetation both submerged and unsubmerged. Two types of vegetation distribution patterns were set up to observe the hydraulic parameters (discharge, depth, Manning's coefficient) and characteristics of flows in channels such the flow-resistance due to vegetation. Parameters affecting flow-resistance due to vegetation for both scenarios are discussed, compared and results are summarized and presented. The relationships dependencies of hydraulic parameters are presented. The results shown that the flow-resistance due to non-uniformly distributed vegetation pattern (λ = 167.56) is higher than uniformly distributed vegetation pattern (λ = 38.24). We also compared experiments with the two forms of vegetation distribution methods to control experiments without vegetation. For further research, the changes type of vegetation, position and others can be investigated. Hence, the study can be improved by checking the water quality within. Analysis and comparisons with rigid vegetation has also should be investigated with the present experimental work on flexible vegetation.

Keywords:

Eco-Hydraulics; Flow-resistance; Hydraulic parameters; micro-drainage; Vegetation distribution

Performance Analysis of Trans-Jakarta Bus Suburban Service Move - Across Greater Jakarta

Ellen SW Tangkudung[a] , Catharina Widyadayinta[b]

[a]*Universitas Indonesia, Kampus UI Depok 16424, Indonesia*
[a]*Universitas Indonesia, Kampus UI Depok 16424, Indonesia*

Trans-Jakarta have developed their services scope as Suburban Service or Feeder move- across service that operate from greater Jakarta into Jakarta central vice versa. One of the route is Ciputat – Bundaran Hotel Indonesia (Tosari) and integrated with corridor 1 (one) and 8 (eight). This service is not travel on the exclusive lane or bus-way. Objective of Government Jakarta to provide this service is to decrease private car to enter the central of Jakarta. The objective of this study is to find the performance of the service. Survey have conducted static and dynamic on work day to get variable of travel time and delay, waiting time of passenger at the bus stop, headway and ridership of the bus. Service Standard Minimum of Trans-Jakarta have compared with the result of variable headway, travel speed, and waiting time at bus stop as concern of all the passengers. Analysis use correlation test method and linear regression model have done. The performance of Trans- Jakarta bus suburban service, based on travel speed indicator is fairly bad, only 8.1% of trip could comply with Minimum Service Standard. Bus performance based on the indicator of density in the bus is good, where all points are below the maximum limit i.e. 8 people/m^2 at peak hour and 5 people/m^2 at off-peak hour.

Keywords:

headway; performance; services; travel speed; waiting time

CE1B - 2

Public Perception of Public Service Announcement (PSA) on Transportation Safety Awareness Through Television in Surabaya

Endang Widjajanti

Civil Engineering Department, Faculty of Engineering and Planning, Institut Sains & Teknologi Nasional (ISTN) Jl. Moh Kahfi 2, Srengseng Jagakarsa Jakarta 12640, Indonesia

One form of transportation safety awareness carried out by the Ministry of Transportation of the Republic of Indonesia is the socialization through television known as Public Service Announcement (PSA) or in Indonesian known as “Iklan Layanan Masyarakat”. This study is part of the activities of Ministry of Transportation of the Republic of Indonesia in capturing responses and perceptions to the aired PSA in Surabaya. The survey method is an interview with a questionnaire. The results showed that only 5% -40% of respondents who noticed five PSA were aired. Approximately 57%-93% of respondents said PSA interesting. Factors of the less attractive PSA is the actors/actress are not interesting. Most respondents suggested in order to be understood and respected by the community, the PSA should be more attractive, the duration should be longer and its frequency should be increased and aired continuously.

Keywords:

safety; transportation; public service announcement

CE1B - 3

Service Delivered on New Transit System from Users Viewpoint (Case Studies : Transjogja and Transmusi-Indonesia)

Aleksander Purba[a*], Fumihiko Nakamura[b], Dwi Herianto[c]

[ac] *Civil Engineering Department, the University of Lampung, Bandar Lampung, 35145, Indonesia* [b] *Graduate School of Urban Innovation, Yokohama National University, 79-5 Tokiwadai, Hodogaya-ku, Yokohama, 240-8501, Japan*

Aiming to tackle the increased motorization in Indonesian cities, particularly motorcycles phenomenon, the Ministry of Transportation (MoT) of Indonesia enacted decree No. 51 of 2007, promoting pilot cities for land transport improvement. From the target of thirty pilot cities by 2014, to date, twenty-seven cities have signed a memorandum of understanding with MoT and launched more than twenty new urban bus systems, including TransJogja of Jogjakarta and TransMusi of Palembang. The aim of this study is to explore user perceptions of new urban bus service, regarding quality of service, subsidy and fare, satisfaction, and loyalty. The structural equation modeling is applied to examine user's satisfaction by testing some hypotheses. According to the level of significance and regression weight, the safety and security (0.784/0.834), and customer service and information availability (0.764/0.514) are the two most important attributes for improving the quality of service of TransJogja as well as TransMusi models, in addition to the subsidy and fare (0.881) attribute in TransJogja model alone. In regards to subsidy and fare policy, the distribution of subsidies (0.833), and effect of subsidization (0.708) attributes are the two most willing to pay attention the local government in the TransJogja model, while the effect of subsidization (0.641) attribute is the one with the highest priority in the TransMusi model which could lead to increase the effectiveness of transport subsidies. In terms of satisfaction, the satisfaction with comfort (0.873), and satisfaction with helpfulness of personnel (0.816) attributes are the two most recommended aspects for the improvement of customer satisfaction in the TransJogja model, as well as loyalty to use if the fare is affordable (0.779), and loyalty to use if the services is satisfactory (0.695) attributes, which are necessary elements for maintaining customer loyalty. Additionally, loyalty to use if the service is satisfactory (0.725) attribute is the one with the highest priority element for maintaining customer loyalty in the TransMusi model.

Keywords:

New urban bus; service quality; SEM; attribute; Indonesia

CE1B - 4

Analysis and Design of Pedestrian Facilities Along Manggarai Railway Station – Manggarai Transjakarta Shelter, Jakarta

Martha Veraida[1], Jachrizal Sumabrata[2]

[1,2]*Civil Engineering Department, Faculty of Engineering, University of Indonesia, Depok, 16424, Indonesia*

Manggarai Railway Station and TransJakarta BRT station is one of the major transit station in Jakarta. Many passengers walk to continue their journey from Jabotabek commuter line station to TransJakarta BRT station vice versa. This research, measured accessibility based on walkability using Global Walkability Index that has already modified based on these 4 factors: road conditions, existing infrastructure conditions, comfortability, and security. Data collected through Likert scale questionnaire that distributed online through social media about the condition of Manggarai sidewalks and pedestrian necessities that would be used for the new facility concept design. Data processed by score weighting and cross tabulation to see whether age affects the assessment or not. The results showed that walkability is affected by pedestrian age with the average walkability index from the four factors is 25,41 from the best value 100. Security acquired the lowest value 23, 83 while the road conditions acquired the highest value 28,17. For the concept design, from three facilities asked on the questionnaire, Fly over is the most widely recommended.

Keywords:

accessibility, Global Walkability Index, Likert scale, pedestrian, pedestrian facility, user necessity, walkability

CE1B - 5

Measurement of Toll Road Service Quality (TRSQ) Using Structural Equation Model Approach

Herry T. Zuna[1], Adani T. Zafira[1], Muhammad Ismail H. Sadjidullah[1*]

[1]*Indonesia Toll Road Authority, Indonesia*

Better service is an essential prerequisite for customers' satisfaction. As a service, toll road applied Minimum Service Standard (SPM) to achieve the level of service expected by users. Understanding which of the attributes prefered by users becomes necessary. Toll Road Service Quality (TRSQ) model is the modification of SERVQUAL model that perceived toll road services from users' perspective. It consists of seven attributes namely information, accessibility, reliability, mobility, security, rest areas, and responsiveness. This study aimed to measure TRSQ model using Structural Equation Model (SEM) with Partial Least Square (PLS). Results suggest the correlation of service attributes in TRSQ model and users' satisfaction. Out of 11 toll roads being surveyed, reliability has the greatest impact on users' satisfaction. Moreover, users deemed accessibility is the most important aspect on toll road services.

Keywords:

Structural Equation Model; Toll Road Service Quality; User Satisfaction; Toll Road

CE2A - 1

Bearing Capacity of Helical Pile Foundation in Peat Soil Based on The Number and Spacing of Helical Plates

Ferry Fatnanta[a], Syawal Satibi[a], Muhardi[1]

[a]Civil Engineering Dept, Faculty Engineering, Riau University, Campus Binawidya Jl. HR Subrantas, Pekanbaru 28294 Indonesia e-mail: fatnanto1964@gmail.com

In the area dominated by peat soil, the type of foundation usually used is driven piles. If observed with the economic view, the driven pile designed without reaching hard soil. The only way for this pile to support the load from structure is from friction between pile and soil. But the surface of conventional driven pile relatively smooth, therefore the friction bearing capacity of the pile become not optimal. One of the way to increasing the bearing capacity of pile is with installing helical plate at the end of pile. Helical plate enlarging the surface area of pile, which expected can increase bearing capacity of the pile.

There are many research about helical pile foundation, but the usage of helical pile foundation on peat soil is still rare and causing the information gap in the usage of helical pile foundation on peat soil. Therefore, this research focused in the study of axial bearing capacity of helical pile foundation on peat soil, especially in Riau Province.

The peat soil was taken from Rimbo Panjang, Kampar District of Riau Province. Helical plate installed on the helical pile foundation with variation of the space and the number of helical plate. Helical plated installed with 20cm, 30cm and 50 cm spacing, while the number of helical plate installed vary from 1, 2, and 3 plates for each helical pile foundation.

The pile with 3 plates installed and with same diameter has better bearing capacity compared with other pile which only installed with 1 and 2 helical plate. The bearing capacity of helical pile foundation is affected by the distance between helical plates. The effective distance for helical pile foundation with diameter of 15cm, 25cm and 35cm is between 20cm to 30cm. This behavior applies to any type of foundation.

Keywords:

bearing capacity, helical pile foundation, peat soil, various number and spacing of helical plates

CE2A - 2

Investigation of Subsurface Characteristics by Using Parameters Vs30, HVSR and Combination of SPAC Method for Microtremor Array in Palu City and Surroundings Central Sulawesi-Indonesia

Sigit Pramono[a,d], Widjojo A. Prakoso[b], Phil Cummins[c], Astri Rahayu[a,d], Ariska Rudyanto[e], Fajri Syukur[e], Sofian[f]

[a]*Phd Student Civil Engineering Department, Universitas Indonesia, Depok,16424*
[b]*Professor of Civil Engineering Department, Universitas Indonesia, Depok, 16424*
[c]*Professor of Departement for Science, Autralian National University, Canberra*
[d]*Lecturer of Civil Engineering Departement, Tadulako University, Tadulako 94119*
[e]*Indonesia Agency of Meterology Climatology and Geophysics, Jakarta 10620*
[f]*Geophysical Station of Palu, Palu 94226*

The development of Ground Motion Prediction Attenuation (GMPE) has been followed with the considered of local site effects parameters. The NGA (Next Generation Attenuation) shows its model involved the local site parameter as the other independence variable in empirical formula of GMPE. In this study, we referred shear wave velocity of the top 30 m (V_{S30}) as one of part local site parameter. The aim this study is to investigate characteristics of subsurface by considered the value of V_{S30}. which is related with the estimation of the shaking in the site when the earthquake occurred. This parameter is preferred for shallow depth of sediment or outcrop site. The measurement for the deep sediment soil carried out by using microtremor array with SPAC method, and dominant period as site period measurement using HVSR method. All these parameters are local site parameters, which related with the description of potential impact in an area near of the epicenter. The measurement of V_{S30} have been done by BMKG – UI, it has conducted V_{S30} measurement on 44 sites and can be continued by BMKG self with conducted survey 10 sites microtremor array and 74 sites period measurement. Palu City is one region of the local active seismic in Indonesia. There is any one major local particular fault, which is very active fault, is Palu-Koro fault system. The development of the city area must be considered by the risk assessmen analyze. Because there is any potential struck from earthquake hazard. The results of comparison show that parameters good strong correlation between V_{S30} and dominant period for the shallow subsurface. The the deep sedimentary soil could be estimated by microtremor array method. Palu area has thickness is dominant alluvium in generally classification of class D in Palu area and some siteclass are C in west-north part of Palu area. The analyze based on soil investigation data available for all parameters has been carried out, to yield description of characteristics of subsurface in Palu City with contribute each of instrument data itself. The information of characteristics of subsurface could be help to consider risk assessmen as part of Region Planning Program especially for population area and commercial area.

Keywords:

NGA, HVSR,GMPE, V_{S30}, SPAC;

CE2A - 3

The Influence of Sand's Gradation and Clay Content of Direct Sheart Test on Clayey Sand

Ismail[1], Erlanda Augupta Pane[1,a*], Damora Rhakasywi, Eko Prasetyo, Pekik Bayu Asmoro[1]
Gunawan Wibisono[1] Soewignjo Agus Nugroho[2] Khairul Umam[3]

Civil Eng. Department, Engineering Faculty, University of Riau, Pekanbaru Indonesia
Civil Eng. Department, Engineering Faculty, University of Riau, Pekanbaru Indonesia
Civil Eng. Department, Engineering Faculty, University of Riau, Pekanbaru Indonesia

The shear strength of clayey-sand can be affected by several factors, e.g. gradation, density, moisture content, and the percentage of clay and sand fraction. The same percentage of clay and sand fraction in clayey-sand mixtures may have different shear strengths due to those factors. This research aims to study the effect of clay content on sand that cause the change of its shear strength. Samples consisted of different clay and sand fractions were reconstituted at a certain moisture content. Sand fractions varied from well-graded to poorly-graded sand. Shear strength was measured in terms of the direct shear test. Prior to the test, surcharge loads were applied to represent overburden pressures. Shear strength results and their components (i.e. Cohesion and internal angle of friction) were correlated with physical properties of samples (i.e. grading coefficient of curvature, coefficient of uniformity, and density). Results showed that samples classified as well-graded and dense sand had higher shear strength. In the other hand, the shear strengths decreased when the mixtures became poorly-graded and less dense. The inclusion of the clay fraction increased cohesion component and decreased internal angle of friction.

Keywords:

Clay, Sand, Density, Gradation, Shear Strength

CE2A - 4

Characteristic and Classification of Fibrous Peat in Banyuasin Regency

Yulindasari Sutejo[a], Anis Saggaff[b], Wiwik Rahayu[c], Hanafiah[d]

[a]PhD Student, Universitas Sriwijaya, Faculty of Civil Engineering, Inderalaya, Ogan Ilir, Indonesia
[b,d] Universitas Sriwijaya, Faculty of Civil Engineering, Inderalaya, Ogan Ilir, Indonesia
[c]Universitas Indonesia, Faculty of Civil Engineering, Depok, Indonesia

Banyuasin Regency is one of the regency in South Sumatera which has an area 200.000 Ha of peatland. The peat soil is known for its high compressibility and low shear strength. Block sampling method was used to obtain undisturbed sample in Banyuasin Regency (Dusun I, Dusun III Banyu Urip, KTM Telang Mulya Sari). This paper presents the results of laboratory soil tests which is performed to determine the characteristics and classification of peats. The physical and chemical characteristics of peat include water content (ω), specific gravity (Gs), Acidity (pH), unit weight (γ), and ignition loss tests. Tests to determine mechanical characteristics involve shear strength (direct shear and triaxial), permeability, and consolidation tests. SEM and EDS test was done to determine the differences in fiber content and to analyze chemical elements of the specimen. The average ω, Gs, and pH obtained from laboratory test are 263.538 %, 1.847, and 3.353. Peat is classified in H_4 (von post scale). The results of organic, ash, and fiber content are found 78.693 %, 21.310 %, and 73.703 %. From the results of physical and chemical tests, the peat in Banyuasin Regency is classified as fibrous peat. The average shear strength parameters obtained from the direct shear test: 23.633^o (ϕ), 7.427 kPa (c) and from triaxial test: 11.283^o (ϕ), 8.308 kPa (c). Beside of that, the average of permeability coefficient is $3.60x10^{-4}$ cm/sec (k_v) and $6.21x10^{-4}$ cm/sec (k_h). More over, the results from consolidation tests based on the compression indecx (c_c) parameters are 1.428 (Dusun I Banyu Urip) and 1.215 (Dusun III Banyu Urip). All the results of the characteristics and classification of fibrous peat are stil within the range of the published data.

Keywords:

Block Sampling, Characteristic, Classification, Fibrous Peat, Banyuasin

CE2A - 5

A Numerical Method of the Rigid Pavement Supported by Soil Cement Column on Soft Soil

Fendi Hary Yanto[a]*

[a]*Department of Civil Engineering, Faculty of Engineering, Universitas Merdeka Madiun, Serayu Road 79 Madiun, East Java, Indonesia*

Many road and highway have been constructed over the soft soil in Indonesia without proper soil improvement for the subgrade. The behavior of the column on the soft soil needs for study numerically and large scale. In this study, a numerical analysis is performed to study the effect of the deformation of the soil stabilized column supported rigid pavement. The main focus of the research is to obtain the deformation. The methodology including comparison the differential settlement of the soil stabilized column supported rigid pavement as control model. The numerical analysis was modeled using finite element method. The simulations result that the column installation to support rigid pavement reduced the heaving and differential settlement of the rigid pavement effectively. The result indicated that the presence of soil cement column considerably contributes to the decrease in deformation due to the increase in stiffness. However, the conclusions of the study were limited to the result of numerical modeling that depended on the applied material model.

Keywords:

numerical model; finite element method; rigid pavement; soft soil; soil-cemented column

CE2A - 6

Integrated Remote Sensing and GIS for Mapping and Classification of Peatland in Riau, Indonesia

Sigit Sutikno[a,*], Manyuk Fauzi[a], Ari Sandhyavitri[a], Rinaldi[a], Akbar Putra[a]

[a]*Civil Engineering Department, University of Riau, Kampus Bina Widya Km 12.5 Pekanbaru 28293, Indonesia*

This paper presents an application of satellite remote sensing techniques to detect and to identify types of blanket peatland in Riau Province, Indonesia. Mapping the spatial distribution of organic soil is important for decision making in land management and disaster mitigation against peat forest fire. Organic soil types have a strong effect on carbon storage, water availability and quality, biodiversity and many other ecosystem services. A large proportion of Riau's soil is organic, and is classed as peats or organomineral. This study has investigated whether Landsat-8 can be used to identify types of blanket peatland on Riau. Rupat Island and Tebing Tinggi Island were picked up as pilot project areas for this research, because these areas historically had many fire spots on last few years. The identification of peatland was done using Principal Component Analysis (PCA) on composites of band ratios and single band variables. The distinction between peatland and non- peatland was easily accomplished, but the identification of different peatland types was more difficult. PCA on a composite of spectral bands 1 to 9 was the most useful composite, but did not improve over the use of NDVI-related band ratios. The results of the analysis were confirmed with the ground check field survey data and other map from a separate study to estimate the accuracy of the proposed method. The results show how the approach can be used to distinguish between peatland and non-peatland and to predict mineral and organic soils at locations within a map unit quickly and cost efective. The map is being used to prioritize monitoring efforts in catchments across Rupat and Tebing Tinggi Island. Resulting peat maps will be useful for decision making on land management and carbon storage in soil. Peat is mapped accurately in most areas, although uncertainty is greater in complex landscapes. Combination of remote sensing and spatial covariates improves accuracy of mapping. The paper discusses further methodologies and information sources which, in combination with Landsat-8 data, could improve the ability to classify peatland.

Keywords:

GIS, remote sensing, peat, land cover

CE2A - 7

Land Subsidence Induced by Ground Water Extraction in Urban Areas of Jakarta City as a Sustainability Countermeasure in the Future

Lolom Evalita Hutabarat[1], Tommy Ilyas[2]

[1]Doctoral Program Student Civil Engineering Departement Faculty of Engineering University of Indonesia, Depok 16424, Indonesia and Lecturer of Christian University of Indonesia Jakarta, Email: lolomevalita@yahoo.com
[2]Civil Engineering Departement Faculty of Engineering University of Indonesia, Depok 16424, Indonesia. Email:tilyas10@gmail.com

Phenomenon of land subsidence in which the level of the ground is lowered from its previous (Marfai and King 2006) has been investigating for many year. Essensially, land subsidence is a process of land elevation movement that is based on a particular datum (geodetic reference frame) which involved multitude of variables of one dimentional consolidation process (Terzaghi 1943). Estimation of land subsidence associated with groundwater extraction has been observed by some researcher using field monitoring equipment as well as numerical modelling for many years. However, the result require complex input of soil and rock property parameters to take into account the complexity of geological conditions and hydrological condition of the aquifer.

For timeline 1925-2015 land subsidence in Jakarta has been monitored by Research Centre for Water Resources as well as Centre for Goundwater and Enviromental Geology. Using field monitoring such as extensometer, leveling survey (GPS geodetic) and observation wells, the current land subsidence measurement in the area of Jakarta provides various results. Some location in North Jakarta from 1990-2016 reached an average land subsidence rate 1,65 cm/year from visual observation. The result of GPS geodetic measurement in 2013-2014 land subsidence in Jakarta range from 0-12 cm/year. Monitoring from seven extensometer sensors installed in different borehole elevation in north Jakarta from 1999-2013 subsidence measurement is 0,66 cm in average.

In order to improve appropriate monitoring system, tools for subsidence awareness- raising to government and society are needed. Sustainability countermeasure of land subsidence is required for various purposes such as urban development master plans and reduction of any environmental problems in the future. This paper aims to study a benchmark of land subsidence induced by ground water extraction in urban areas of Jakarta city, using continous monitoring system and integrated data management system.

Keywords:

land subsidence, ground water extraction, consolidation, continous monitoring system

CE2A - 8

Effectiveness of Horizontal Drain for Slope Stability of Coal Mining, Case Study of Slope Failure in Tambang Guntur, South Kalimantan

Yulian Firmana Arifin[a], Setyo Mulyo Kurniawan[b], Ellyn Normelani[c]

[a,b]*University of Lambung Mangkurat, Banjarbaru 70714, Indonesia*
[c]*Coal Mine Manager, PT. Utami Jaya Mulya, Banjarbaru 70714, Indonesia*

Slope failure occurred in Tambang Guntur PT. Borneo Indobara in Tanah Bumbu, South Kalimantan results in not only technical problems but also a financial problem. The mining operation was terminated. An investigation was conducted to determine the cause of the landslide and obtain methods to prevent further landslides. This study focused on the inquiry into the slope failure occurred in the location mentioned above. Several boreholes were performed to determine detail sub-soil layers and soil properties especially the shear strength of soils. A piezometer was installed and used to obtain the pore-water pressure data located close to the landslide. Additional data such as rainfall data and topography data is also used. A calculation using computer program was also used to model and obtain the safety factor of the slope. The result shows that the landslide occurred due to extremely high rainfall and extended period of rain. A horizontal drain was installed to reduce pore-water pressure as a method of slope stabilization. This paper presents and discusses the effectiveness of the horizontal drain in the field to stabilize the slope.

Keywords:

Landslide; Coal mine; horizontal drain; rainfall; slope stability

CE2A - 9

Geotechnical Characteristics of Bantargebang Solid Waste Landfill using Artificial Waste Sample and Field Test

Erly Bahsan[a], G.S. Boedi Andari[a], Sarah Pramiarsih[a], Syahrizal A. Latief[a]

[a]*Department of Civil Engineering, University of Indoneshigher ia, Depok 16424*

To analyze the stability of waste landfill, it is necessary to know the geotechnical characteristics of the solid waste material, especially the parameters that related to the stability calculation such as the strength parameters (cohesion and friction angle). The physical properties of the materials are also important, as well as the composition of the waste. This study conducts laboratory and field tests to obtained the aforementioned characteristics from a typical urban landfill in Indonesia. The case study is taken to be the TPST Bantargebang landfill. Due to the difficulties in obtaining undisturbed sample from waste landfill, the laboratory test was conducted using the artificial solid waste sample. Direct shear test was conducted to get the strength parameters of the artificial waste samples. Besides the laboratory test, field tests (cone penetration test, CPT & dynamic cone penetration test, DCPT) were also conducted on the closed landfill zones in TPST Bantargebang to obtain the typical bearing capacity of the fill materials. The results from direct shear test shows that the cohesion value of the waste material is in an agreement with the initial compression: higher compression results to higher cohesion, while the friction angle is in a contrary. The range of cohesion value is ranged between 0 to 41 kPa, and the range of friction angle is between 0 to 26°. The cone resistance value (qc) up to 10 m depth is in the range of 2 to 10 MPa. The equivalent CBR value from DCPT is ranged from 4% to 21%. Despite the large variability of bearing capacity at the top layers shown by the DCPT results, the CPT results in the field show that the bearing capacity (also the strength characteristics) of the waste materials is linearly increase along with the depth.

Keywords:

Strength; Solid water; landfil; stability; sartificial sample; geotechnical characteristics; bearing capacity

CE2A - 10

Study Gradation and Moisture Content of Sand Embankment on Peat Subjected Vibration Potential Liquefaction

Agus Ika Putra[1] Soewignjo Agus Nugroho[2] Muhamad Yusa[3]

[1]*Civil Engineering Undergraduate Program University of Riau, Kampus Bina Widya, Pekanbaru 28293, Indonesia*
[2]*Soil and Rock Mechanics Laboratory, Engineering Faculty,Riau University, Subrantas KM 12.5, Pekanbaru 28293, Indonesia*
[3]*Civil Engineering Department University of Riau Kampus Bina Widya Subrantas KM 12.5 Faculty Riau University, Pekanbaru, Indonesia*

In recent years large earthquakes often occur on the island of Sumatra. There is a phenomenon of the damage occurred during the earthquake, one of the effects is a phenomenon of loss of soil strength due to vibration called liquefaction. Some cases of liquefaction occur in some areas in Aceh, Nias Island, Padang and Pariaman. Pekanbaru is located close to the fault area that causes the occurrence of earthquake wave propagation. Pekanbaru are also at risk for geotechnical problems because of earthquake such as liquefaction. Evaluation of liquefaction potential could using by in-situ test and by laboratory test. The laboratory test to evaluation liquefaction potential among which method of experiment shaking table. In this study, liquefaction phenomenon was conducted by creating a physical model of a laboratory scale using a one-way vibration machine, with a review of how big the influence of sand gradation, sand shaped and grain- size, and surface water level in the sand against liquefaction potential. Evaluate of liquefaction potential based on the surface reading of the soil movement, elapsed time for final settlement and an excess pore water dissipation (EPD) during testing. Based on the results of performed test, indicated that fine sand on fully saturated conditions have the potential of maximum settlement for 20.67% and maximum ascend of pore water for 46.67%. This result mean that poorly graded fine sand on fully saturated conditions has more liquefaction potential than medium sand, coarse sand, and well graded sand

Keywords:

liquefaction; settlement; excess pore water pressure; gradation; grain size

CE2A - 11

Comparing Shear-Wave Velocity from Masw with Borehole Measurement at Merapi Sediment in UMY Campus

Astri Rahayu[1a], Imam A. Sadisun[2b], Agus S. Muntohar[3c], M. Muzli[4d], Ariska Rudyanto[5d],Widjojo A. Prakoso[*1,a]

[a] *Universitas Indonesia, Kampus UI, Depok 16424, Indonesia*
[b]*Institut Teknologi Bandung, Jl. Ganesha 10, Bandung, Indonesia*
[c]*Universitas Muhammadiyah Yogyakarta, Kampus UM Y 55183, Yogyakarta, Indonesia*
[d]*Badan Meteorologi Klimatologi dan Geofisika, Jl. Angkasa I No. 2 Kemayoran, Jakarta Pusat 10720,Indonesia*

The next generation ground motion prediction models use shear-wave velocity over the top 30 m subsoil (V_{S30}) as an important assessment parameter of seismic ground surface motion. The V_{S30} can be measured using invasive methods, such as borehole, or using non invasive methods, such as multi-channel analysis of surface waves (MASW). To evaluate the technique in a variety of near-surface conditions MASW derived Shear-Wave Velocity profiles (S-Wave Velocity vs. depth) were statically compare to direct borehole measurement at three location at Merapi sediment in UMY campus site. A detailed study of the effect from the total number of recording channels, sampling interval, source offset and receiver spacing was conducted in test site. An overall difference range around 20 percent was observed between these two uniquely determinaned sets of Shear-Wave velocities. The MASW method provided reliable Shear-Wave velocity profiles from 2 to 30 meters below the ground surface at the same site.

Keywords:

Shear-Wave Velocity; MASW; Merapi sediment; V_{s30}

CE2B - 1

Rigid Pavement Road Condition Assessment With Highways Method And Pavement Condition Index (PCI) Method In Dumai City Limits Roads - Duri City at STA 173 + 000-177 + 000

Fitra Ramdhani[a] , Husni Mubarak[b], Equinaldo[a,b]

[a]*Departement of Civil Engineering Universitas Abdurrab, Riau Ujung Street No. 73, Pekanbaru 288, Indonesia*
[b]*Departement of Civil Engineering Universitas Abdurrab, Riau Ujung Street No. 73, Pekanbaru 288, Indonesia*

Limit road segments Kota Dumai - Duri is one of access two important city in the province of Riau, it's Dumai City and Duri City (Bengkalis regency) that function as an arterial road with status as a national road. This road is often be passed various types of vehicles, both light vehicles and heavy vehicles. With traffic conditions, especially heavy vehicles is very crowded passed it's causing structural damage to the road surface in some parts of the road segment. Appraisal the condition of the road on the pavement surface is one step in the determination of maintenance management program to a segment or road segments that need to be handled. This study pupose is to determine the road condition on the road section Dumai City - Duri precisely at STA 173 + 000-177 + 000 and also to determine the type of precise handling program in maintenance. In this study used two methods in assessment the condition of roads, Highway Method (Binamaga Method) and Pavement Condition Index (PCI) Method. Based on the results of the analysis, the greatest damage type, either use Highways Method and PCI Method is type of slippery aggregate damage. But for the smallest percentage of damage, there is a difference between Highways Method and PCI Method. This is due to a difference in the election unit examined samples. In the Highways Method the smallest damage percentage is type of popouts damage while in PCI method obtained the smallest percentage value of the damage isa type of fracture damage on plate. Results of assesment rigid pavement road surface conditions at STA 173 + 000-177 + 000 in Dumai Limits road - Duri City by Highways method obtained damage limitation percentage on 2.40% to the size of the surface layer of pavement surveyed road conditions were rated as " good (B) "the obtained result of determination program, namely road handling routine maintenance. While the results of the condition assessment of PCI method, PCI value obtained with a value on 65.25 road conditions as "Good " and the determination program of road maintenance is regular maintenance. It can be concluded that the results of assessment of the condition of Dumai Limits road - Duri City at STA 173 + 000-177 + 000 using either a Highways Methods and Pavement Condition Index (PCI) Methods in determining the assessment of road conditions and determining the program road plan maintenance obtained the same results.

Keywords:

Rigid Pavement, Road Condition Assessment , Highways Methods, Pavement Condition Index (PCI), Surface Layer of Pavemen

CE2B - 2

Identification and Improvement of Accident Blackspots on National Road in Samarinda

Endang Widjajanti[a], Ismono Kusmaryono[b]

[a]*Civil Engineering Department-Faculty of Engineering and Planning,Institut Sains & Teknologi Nasional,Jl. M.Kahfi II, Jagakarsa Jakarta 12640, Indonesia*
[b]*Civil Engineering Department-Faculty of Engineering and Planning,Institut Sains & Teknologi Nasional,Jl. M.Kahfi II, Jagakarsa Jakarta 12640, Indonesia*

This paper describes identification and improvement of accident black spots on national road in the city of Samarinda. Methodology adopted includes collecting the secondary data from respective authority, conducting physical survey (primary data) and analyzing them by method of ranking and severity index. Technique of identifying the ranking of accident site is carried out by determining the Weighted Accident Number (WAN). Based on WAN value, it was found three locations of accident black spots on national roads in the city of Samarinda, those are KM 1, KM 4 and KM 5 of Jalan SP3-SP3 Lempake Sambera. Jalan SP3-SP3 Lempake Sambera is the intra urban national road in the city of Samarinda. Further corrective measures as the improvement of the road facilities, were suggested as the handling programs of the accident black spots.

Keywords:

accident; black spots; national road

CE2B - 3

Performance of Asphalt Concrete Wearing Course (AC-WC) Utilizing Reclaimed Asphalt Pavement from Cold Milling Bound with 80/100 Pen Asphalt

I Nyoman Arya Thanya[a], I Wayan Suweda[b], Gde Kossala Putra[c]

[a, b,c] *Civil Eng. Dept. Udayana University, Bukit Jimbaran-Bali, Denpasar, 80361, Indonesia.*
Email corresponding author: aryathanaya@unud.ac.id

Demands on natural aggregate materials for road pavement can be reduced by utilizing reclaimed asphalt pavement (RAP). This research was aimed at evaluating the performance of AC-WC mixture using RAP materials from cold milling, bound with 80/100 pen asphalt. The performances evaluated were the Mixture's Marshall properties at optimum asphalt content, cantabro, indirect tensile stiffness modulus, dynamic creep and fatigue. The RAP aggregate gradation was adjusted by adding the required amount of natural aggregates to meet the specification in Indonesia. The RAP and added aggregates were hotmixed and compacted with Marshall hummer at 2x75 blows. The asphalt content were varied. It was found that the optimum asphalt content was 6.05 % with the following Marshall characteristics: stability 1237.08 kg (≥ 800kg); flow 3.36 mm (≥ 3.0 mm); Marshall quotient 324,73kg /mm (≥ 250 kg/mm); void in mix (VIM) 3,360% (3.0-5.0%), void in mineral aggregate (VMA) 15.103% (≥ 15%); and void filled with bitumen (VFB) 77.759% (≥ 65%) and residual stability 91.04 (min.90%). The cantabro abration loss (CAL) at 30°C was 9,02% (spec < 16%). The indirect tensile stiffness modulus (ITSM) at 20 0C was 7961.4 MPa; dynamic creep with 100 kPa pressure at 40°C gave slope 0.0112 microsstrain/pulse which is suitable for heavy load traffic; fatigue test with stress ranges of 300, 500, and 700 kPa did not fail the samples up to 40,000 times repeated loading. The fatigue test results was obtained at increased stress level, i.e. at 900, 1100, and 1300 kPa. Based on the equation derived from the strain and repeated loading relationship, at 100 microstrain (με) the repeated load was 434,661.58 times, and at one million (10^6) repeated loading, the samples could withstand strain of 92,38 microstrain. The performance of the samples were overall better than AC-WC mixture using virgin aggregates bound with 60/70 pen asphalt.

Keywords:

AC-WC; cantabro; creep; fatigue; ITSM; Marshall; 80-100 pen asphalt; RAP

CE2B - 4

Costumer Satisfication of Feeder Transit of Transjakarta Corridor Pulo Gadung – Dukuh Atas 2, Jakarta: Structural Equation Modeling Analysis

Jachrizal Sumabrata[1], Samuel Edy Mataram Simanjuntak[2,] Jachryandestama[3]

[1]*Centre for Sustainable Infrastructure Development FTUI, rjs@eng.ui.ac.id*
[2]*Civil Engineering, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia*
[3] *Institute of Transport and Logistics Studies, University of Sydney*

PT. Transportasi Jakarta, supervised by Government of DKI Jakarta, tries to improve Transjakarta BRT services for its customers. To support the BRT system, PT. Transportasi Jakarta provides Transjakarta feeder buses that operate to transporting passengers outside Transjakarta bus lanes to Transjakarta bus stops. Along with Transjakarta feeder buses, private owned public transports are also used as feeders of Transjakarta despite their condition. Private owned public transport has begun aging, and its service quality has been decreasing. Moreover, customer satisfaction is crucial because it influences consumers' decision to use public transport. PLS-SEM (Partial Least Square- Structural Equation Modeling) analysis conducted to determine customer satisfaction to quality of service. The studies are limited to feeder transport users in the corridors 4 (Pulo Gadung - Dukuh Atas 2). The results are that Transjakarta feeder bus users are very satisfied with the service and transport facilities variable. On the other hand, private owned medium size bus transport (Metro Mini) users are very satisfied with the information and technology variables mainly on the availability of public transport information while private owned small bus transport (Mikrolet) users are very satisfied with the safe and security variable mainly on security in carrying passenger goods.

Keywords:

Service quality, passengers' satisfaction, SEM (Structural Equation Modeling), Transjakarta Feeder Transit

CE2B - 5

Impact on Ridership of New Railbase Transit due to the Operation of Exensive Bus Semirapid Transit Network (Case Study : Jabodetabek Public Transport Network)

Edy Hadian[a], Alvinsyah[b]

[a]*Transport Research Group,Civil Engineering Department, University Of Indonesia, Depok, Indonesia*
[b]*Transport Research Group,Civil Engineering Department, University Of Indonesia, Depok, Indonesia*

The objective of this research is to observe the implication of an extensive bus semirapid transit network operation on the new railbase transit ridership. A transport demand model based on the four step modeling approach is utilized to analyze the change on the ridership. The model is developed from previous works and adjusted through a calibration and validation procedure with various data collected from the field. Model of the base year O- D matrix is calibrated by trip length frequency distribution through a matrix balancing process. While the passenger flow is validated through transit assignment procedure with passenger counting data on the existing bus routes. Based on the assumptions made and different operational characteristics and fare system scenarios, a simulation through the developed model on new railbase transit ridership is conducted. From the analysis, when operated individually, the new railbase transit ridership will reduce significantly due to the operation of bus semirapid transit network. Yet, if both transit modes are operated as an integrated system, the simulation result yield to a better ridership.

Keywords:

Bus Semi Rapid Transit; Railbase Transit; Ridership; Transport Model

CE2B - 6

An Assesment on Sustainability of the Railway - Airport Link as An Alternative Mode of Transportation to Radin Inten II Airport

Ika Kustiani and Amril Ma'ruf Siregar

The rapid economic development in the Province of Lampung is indicated by, among other things, the increase of air transportation mode users. The data shows that for the last four years, the number of passengers of the Radin Inten II Airport increased by 52% and the number of cargos increased by 257%. To support these demand, cost-effective and efficient transportation systems are vital, therefore the government has recently completed the construction of the Radin Inten II Airport expansion. Moreover, currently the government is planning to build a link between the airport facilities with railway transportation mode. This link provides additional alternative of transportation to airport. This research was carried out to assess the future demand for railway transportation mode to airport and to measure how this can achieve financial, environmental and social performance for sustainability. The assessment methods were utilizing dynamic, purposive and random sampling method to review the opinion of stakeholders of transportation system to airport. Stakeholders' opinion survey also reviewed a set of physical and managerial interventions that could potentially be implemented to improve the performance and sustainability of the railway transportation system. These interventions were drawn from suggestions made by experts in transportation system. The review of these proposed interventions was executed by integrating the results from a stakeholders' opinion survey with a Triple Bottom Line (TBL) sustainability framework. The integration of these two methods was designed to identify an alternative solution that was not only robust but also preferred by the stakeholders of railway and airport transportation system. The results showed that the physical changes that required large capital cost were less desirable and the managerial changes that give private company a greater authority were less favourable by all stakeholders.

Keywords:

Transportation mode; Sampling method; Stakeholders opinion survey; physical and managerial interventions; Triple Bottom Line sustainability framework;

CE3A - 1

2D Numerical Modelling of the Hole Erosion Test

Jessica Sjah[1], Eric Vincens[2], and Jean-Christophe Marongiu[3]

[1]*Department of Civil Engineering, Faculty of Engineering Universitas Indonesia, Depok, Indonesia*
[2]*Laboratoire de Tribologie et Dynamique des Systèmes (LTDS), École Centrale de Lyon, Université de Lyon, Écully, France*
[3]*ANDRITZ HYDRO, Villeurbanne, France*

This paper presents a 2D numerical simulation of the Hole Erosion Test (HET). The fluid was modeled using SPH-ALE (Smoothed Particle Hydrodynamics – Arbitrary Lagrangian Eulerian) method. A laminar flow was considered here. The 2D numerical simulations of viscous flow around a circular cylinder for Reynolds number (Re) = 100 are examined to validate this method at particle scale. Then, the validation at sample scale will be performed by studying the fluid flow through smooth pipe wall. The coefficient of friction was calculated and compared to the analytical solution. At last, the hydrodynamic forces on the pipe wall made of fixed soil particles were evaluated for a given Re. When the pipe opening is small compared to the soil particle size (relative roughness on the order of 50%), the simulations show that the standard deviation of the hydrodynamic forces are of the order of the mean values. Thus, the mean values cannot characterize the fluid loading on the pipe wall particles and the magnitude of the expected erosion process. Moreover, the prominent pipe wall particles induce great pressure contrasts along the pipe wall. Finally, the hydrodynamic forces due to pressure were found much greater than the ones due to fluid viscosity.

Keywords:

Internal erosion; Fluid-solid interaction; Hole erosion test; SPH-ALE method; Laminar flow

CE3A - 2

Issues of Shear Deformation Measurement in Experimental Studies

Basyaruddin[a,*], Min Yuan Cheng[b]

[a]*Dept. of Civil Engineering, Kalimantan Institute of Technology, Balikpapan, Indonesia* [b]*Dept. of Structural Engineering, National Taiwan University of Science and Technology, Taipei, Taiwan*

Shear deformation determined using "X configuration method" is controversial. The new instrumentation technology, optical system, provides a useful tool to evaluate different traditional instrumentation plans. Through investigations of two case studies, this research presents an interesting finding about the instrumentation plan to measure shear deformation in reinforced concrete beam elements. Focus of this study is placed on beam specimens subjected to earthquake-type loadings. In previous research, the experimental setups of reinforced concrete (RC) beam elements subjected to cyclic reversed loadings can be divided into two types. Depending on different situations such as test capacity and specimen length-to-depth ratio (shear span ratio), researchers adopted experimental setups by creating either single-curvature or double- curvature scenario for the test specimens. Shear deformation of two specimens was re-investigated in this research. One of those (SP3) was representing a RC beam member using a single curvature test scenario and a coupling beam specimen (CB2) was representing a RC beam member using double curvature test scenario. The new instrumentation technology, the optical system that uses infrared signal to track the movements of "markers" in 3 dimensions has become increasingly popular, provides a useful tool to evaluate different traditional instrumentation plans. Shear deformation is evaluated with different gauge lengths. The best-possible solutions of both specimens are determined using the optical system with the finest grid. Error is estimated by comparing results from "X Configuration" method with the best-possible solution. On the other hand, the "X Configuration" method representing the traditional instrumentation analysis is conducted using markers at the edge of the specimens. Analysis results indicate that the smaller gauge length yields the better results. A gauge length of 6.3 in. (160 mm) from X configuration method gives the smallest error, less than 10 %, in measuring shear deformation in a flexural governed member. It suggests that the gauge length to measure shear deformation in a coupling beam specimen can be limited within 16.5 in. (420 mm). The largest gauge length from X configuration method in measuring shear deformation shows the largest error for both specimen SP3 and specimen CB2.

Keywords:

Shear deformation, instrumentation, "X configuration", optical system, gaugelength

CE3A - 3

Error Estimation for DKMQ24 Shell Elemnt by Using Various Recovery Methods

Irwan KATILI, Imam Jauhari MAKNUN

Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia

This paper presents an application of DKMQ24 element for error estimation using error estimator Z^2 and various recovery methods such as Averaging (AVR), Projection (PROJ) and Superconvergent Patch Recovery (SPR). The stresses found by using these recovery methods will be compared to the reference solution. We found that Averaging and SPR method gave better results compared with the Projection method.

Keywords:

DKMQ24; Error Estimation; Averaging; Projection; SPR; Shell Element

CE3A - 4

Calculation The Edge of Slab Deflection of Modified Cakar Ayam System by Applying The Displacement Factor From Puri's Graph

Anas Puri[a,1]*, Rony Ardiansyah[a,2]

[a]*Civil Engineering Departement, Universitas Islam Riau, Pekanbaru*
[1]*anaspuri@eng.uir.ac.id*, [2]*ronyardiansyah@eng.uir.ac.id*

Simple method in Nailed-slab pavement ssystem analysis was proposed by previous researcher. This method uses equivalent modulus of subgrade reaction (k'). This modulus consists of the modulus of sub grade reaction from plate load test (k) and additional modulus of sub grade reaction due to pile installing (∅k). The additional modulus of sub grade reaction has been also proposed by some authors. Displacement factor was used in determining the additional modulus of sub grade reaction. The curve of this factor was proposed by Puri (2017) for soft clay, and the curve of the invers one was proposed by Hardiyatmo (2011) for stiff clay. This paper will disscuss the application of the curve of displacement factor from Puri'graph (2017) to calculate the deflectios of Modified Cakar Ayam (MCA) pavement system. Calculated deflections based on this curve were compared to the observed deflection. The deflection was calculated by using Beam on Elastic Foundation method. Full scale test result from MCA pavement system was used. The concentric and edge loading points were considered. The calculated deflection based on single-row shell of MCA pavement system was compared to the observed deflection from three-row shell. Results show that the calculated deflection in good agreement with the observation, althought it was very over-estimated about 390% to 665%. In this case, Over- estimated was caused by ignoring the end bearing resistance of shell in determining the additional modulus of subgrade reaction ∅k. It could be also because of neglecting the lean concrete, shell connector, and vertical wall barrier. The Puri's graph can be used to determind ∅k for MCA analysis, but in further research it should be considered the end bearing resistance of shell.

Keywords:

rigid pavement; Modified Cakar Ayam System; slab deflection; subgrade modulus; displacement factor.

CE3A - 5

Numerical Evaluation of Shear Behavior of a Metal Shear Key Used in Joining Precast Concrete Segmental Bridge Girders without Epoxy

Heru Purnomo[a,*], Rosi Nursani[a], Sekar Mentari[a], Sjahril A. Rahim[a], Elly Tjahjono[a]

[a]*Civil Engineering Department, Universitas Indonesia, Depok 16424, Indonesia*

Shear key is one of important parts in a precast segmental concrete bridge. Besides it partially contributes to distribute shear force from one concrete segment to another segment, it helps joining the precast concrete segments becoming a complete structure of bridge providing continuity of movement of vehicles and pedestrian traffic. This numerical study discusses the behavior of a full scale shear key connection without epoxy joining two concrete blocks representing segmental precast concrete at which two external forces load the blocks. Ferro cast ductile is used for metal shear key material where the shear key consisting of two parts, male and female shear key. Numerical Simulation is conducted with the aid of ANSYS package where non linear analysis is implemented accordingly. Appropriate constitutive material relation for the numerical program, both for concrete and ferro cast ductile are taken from appropriate literatures. Two failure criteria are employed in the study, which are failure of concrete block or yield in shear key using Von Mises Criteria. Using those criteria, shear key connection system capacity is evaluated by applying different magnitude of horizontal forces. Results of this study show that higher shear stress of ferro cast ductile shear key connection is resulted by the shear key connection, which receive larger horizontal force. However, the larger the horizontal force, male shear key will experiences failure. Validation of two numerical simulation studies is conducted by two experimental programs that cover laboratory experimentation of full scale shear key connecting two concrete blocks. Numerical and experimental results produce almost similar relation of shear stress at the male shear key and vertical displacements of the upper block relative to the lower concrete block. Finally a contour of shear key shear stress as function of different magnitude of equivalent pre-stressing and different quality of concrete compressive strength is proposed.

Keywords:

Equivalent pre-stressing force; ferro cast ductile; shear key; shear stress; vertical displacement

Comparative Analysis of Layer Methods of T-Beam Reinforcement

Dimas Langga Chandra Galuh[a], Widarto Sutrisno[b]

[a,b] *Fakultas Teknik Universitas Sarjanawiyata Tamansiswa, Jl.Kusumanegara 157 Yogyakarta, Indonesia*

Wire rope is commonly used by heavy equipment in order to lift weights. It has a high tensile strength. This study used this material as reinforcement material in the T-beam negative moment area. In the analysis stage, the T beam reinforcement used layer methods by comparing the layers1 method (ignoring the wing reinforcement) and layers2 method (considering the wing reinforcement). Results of the test show that the maximum loading for BK, BP1, and BP2 specimens are 88.5 kN, 180 kN, and 259 kN, respectively. The comparative flexural capacity by layers1 method (ignoring the wing reinforcement) for BK, BP1, and BP2 specimens are 1.28, 0.76, and 0.78. The comparative flexural capacity by layers2 method (considering the wing reinforcement) for BK, BP1, and BP2 specimens are 1.28, 0.79, and 0.80, respectively. Comparative ratios of layers2 method for BK, BP1, and BP2 to layers1 method are 1, 0.96 and 0.975, respectively. The results show that the means of comparative analysis layer methods are similar. The method of layers2 is the closest with the test results.

Keywords:

T-beam, wire rope, layers method, negatif moment, reinforced

The Role of Governance and Its Impact on Project Scope – A Case Study

Eric Too[a], Tiendung Le[a,] Wei Yee Yap[a]

[a]*RMIT University, Melbourne Australia*

To achieve optimal value from investment in a project there must be a clear link between the outputs created by the project and the goals of the organization. To this end, organizations must have a structure in place for aligning the project deliverables with their organizational goals. The success or failure of projects is dependent on not only the implementation performed by the project manager and project team; project governance by senior management also plays a critical role. The lack of support, conflicting objectives and other contextual issues in the domain of senior management can have negative influence on the progress and outcomes of projects. A key theme in the research is governance, or the lack thereof. This paper examines the role of project governance in the new LCC hub or better known as Kuala Lumpur International Airport 2 (KLIA2). It analyzes the KLIA2 case based on information available in the public domain. Specifically, it examines how governance was exercised in the project and how it impacts the project's scope and the outcome. The analysis of the case provides lessons learned that can be used to improve governance practice and project success rate. These lessons learned can also serve as guidance to organizations in designing effective governance structures that can enable projects to deliver benefits to the organization and its stakeholders.

Keywords:

Project Scope; Project Governance; Value;

CE3B - 2

Identification of Country Standard Measureable Influence Indicators on Construction Project Duration Performance in Indonesia

Basuki Anondho[1]; Ayomi Dita Rarasati[2]; Yusuf Latief[3]; Khrisna Mochtar[4]

The duration of construction project implies a complex interaction with various aspects that affect or influence the duration itself. Developing a descriptive model to determine those dominant influence variables should give an alternative option on duration prediction models and provide convenience to understand the practical purpose. This practical purpose needs a measureable indicator factor that commonly provides such like official country statistical data. Since there are lot of country statistical data, identifying measureable indicators become important as dominant influence indicators on construction project duration. The current research describes step by step identifying dominant influence external factors in building construction project in Jakarta, Indonesia. The process started with literature selection to identify factors influence the performance of construction industry. The output of literature study was followed by exploratory phase to analyzing the output of questionnaire based on the literature study. Exploratory phase reduce and grouping factors by identifying dominant factors so it accommodates the practical purpose. The next phase was confirmatory by analyzing dominant factors in an integrated relation system. At this phase, the floor area and number of story are included in the system using Partial Least Square – Structural Equation Modelling (PLS-SEM). The results show that the rates of exchange currency value, interest, inflation, GDP, absorb of new technology, labor availability, materials price are the dominant indicators out of 12 origin indicators.

Keywords:

Measureable Indicators, Factors Analysis, PLS-SEM, Influence Variable, Project Duration

CE3B - 3

Development of Integrated Management System between Quality Management System and Occupational Health and Safety Management System in Ministry of Public Work and Public Housing – A Conceptual Framework

Ringgy Masuin[1], Yusuf Latief[2], T. Yuri Zagloel[3], Leni Sagita[4]

[1]*Doctoral Program Student Civil Departement Faculty of Engineering University of Indonesia*
[2]*Professor, Civil Departement Faculty of Engineering University of Indonesia*
[3]*Professor, Industrial Engineering Departement Faculty of Engineering University of Indonesia*
[4]*Lecturer, Civil Engineering Departement Faculty of Engineering University of Indonesia*

This paper reviews the literature on integrated management system (IMS) between quality management system and occupational health and safety management system. The term integrated management system is clarified as it is typically applied to integrated risk, integrated process, and integrated audit in order to achieve orderly construction. The objective of the present study is to analyze the evolution of IMS research, presenting its contributions and gaps in the IMS scope. The analysis was conducted through a theoretical framework of IMS. Some clarification in terms of integrated risk, integrated process and integrated audit of engineering and its theoretical developments. Methodology used in this paper is comprehensive literature review of integrated management system between quality management system and occupational health and safety management system to influence performance of integrated risk, integrated process and integrated audit of quality and safety system in orderly construction. This paper piloting project in time phase of activities In Ministry of Public Work and Public Housing as a core activities. Results of this study shows conceptual framework for development of integrated management system between Quality Management System and Occupational Health and Safety Management System. All management systems were used Deming Cycle (PDCA) theory and have common feature. In this study, author found that Fayol Theory based on activities management can develop management system into integrated management system. Based on activities in System Engineering Phase, authors found that life cycle system in construction are the best system suited in Integrated Management System between Quality Management System and Occupational Health and Safety Management System as the state-of-the-art of this research. This integrated management system was piloting in Ministry of Public Works and Housing Provision that application of independent system management. Implementation of integrated management system assumes can achieve orderly construction with less of rework, less risk of accident, and risk of waste. It is suggested the gaps found in this paper are explored in future studies.

Keywords:

Integrated Audit, Integrated Management System, Integrated Process, Integrated Risk

CE3B - 4

Analysis of Retrofit on School Building with Shear Wall and Steel Bracing

Fauzan[a1], Febrin A. I[b], Farizzi A. S. [c], Yogi I. R. [d], Zev A. J. [e]

[a,b]*Lecturer at Department of Civil Engineering, Andalas University, Padang City, 25163, Indonesia*
[c]*Construction Engineer at PT Total Bangun Persada, 11440, Indonesia*
[d]*Enginner Staff at PT Waskita Karya, 13340, Indonesia*
[e]*Student at Department of Civil Engineering, Andalas University, Padang City, 25163, Indonesia*

The earthquake on 30 September 2009 with 7,6 magnitude occurred in West Sumatera and it caused the damage to both physical public facilities and infrastructures. The education sectors suffered from structural damage to the school buildings. In order to establish of the new Indonesian Seismic Code, SNI 03-1726-2012, it will affect to the performance of structures which was built before the establishment of the new seismic code, in which the building may not be adequate to withstand the working loads. In this study, the performance and strucutral strength of a two-story RC school building (SMAN 3 Batusangkar) designed using previous seismic code (SNI 03-1726-2002) and it was constructed before 2009, was evaluated based on the new seismic code. The result of evaluation on the SMAN 3 Batusangkar building shows that the building can not resist the working loads applied to the structure, especially the earthqukae loads, so the building structure needs to be retrofitted. Two retrofitted methods of the builiding were proposed in this study, they are using shear wall and steel bracing systems, which installed on the building frame with different locations. The addition of shear wall and steel bracing are very effective in strengthening the building structure, where the load-bearing capacity of the structure increased significantly and the building is able to resist all working loads.

Keywords:

Earthquake, Retrofit, Shear Wall, Steel Bracing, School Building.

CE3B - 5

Development of Institutional Funding Model of Deep Discount Bond on Toll Road Projects

Muhammad Haikal Syarief, Yusuf Latief, Ayomi Dita Rarasati*

Civil Engineering Department, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia

The high investment in infrastructure projects including toll roads makes government seek new funding schemes without charging the entire construction budget on the State Budget. Therefore, an alternative funding scheme is necessary to attract investors to fund and develop toll roads in Indonesia especially at the Trans-Sumatera Toll Road (TSTR). The answer might be found with the Deep Discount Bond (DDB) funding scheme which is potentially positive for the development of toll roads in Indonesia. This answer can address new issues, but to ensure that it can be implemented, an institutional model is needed to regulate stakeholders' involvement. Realizing that interactions among stakeholders are very influential on the success of the project, the effective institutional model is aimed at avoiding possible conflicts. This institutional model cannot be properly designed without knowing the success factors required to effectively implement DDB funding scheme. This research has three objectives: firstly, to identify relevant stakeholders involved in providing DDB funding schemes; secondly, to identify DDB institutional model's success factors; and thirdly, to determine the appropriate DDB funding scheme institutional model for Trans Sumatera Toll Road. This research methodology included data collection, and three- phase in-depth interviews and Relative Importance Index and Multi Criteria Analysis. The results identified ten stakeholders with their roles, ten institutional success factors and an institutional funding model to implement DDB for TSTR.

Keywords:

Deep Discount Bond; Institutional Model; Stakeholder; Toll Road

CE4A - 1

Numerical and Analytical Investigation of Steel Beam Subjected to Four-Point Bending

Fransisca Maria Farida[1,2], Adang Surahman[3], Ananta Sofwan[4] and Rino Rakhmata Mukti[5]

[1]*Doctoral student of Civil Engineering, Civil Engineering and Environmental Faculty Institut Teknologi Bandung, Bandung, 40132, Indonesia, email: fransisca_farida@students.itb.ac.id*
[2]*Lecturer of Civil Engineering Department Engineering Faculty Universitas Negeri Jakarta, Jakarta 13220, Indonesia, email: fransisca_farida@unj.ac.id*
[3]*Lecturer of Civil Engineering, Civil Engineering and Environmental Faculty Institut Teknologi Bandung, Bandung, 40132, Indonesia, email:adangsur@ganesha.itb.ac.id*
[4] *Engineering Staf, P.T. LAPI, Institut Teknologi Bandung, Bandung, 40132, Indonesia, email: anantalapiitb@gmail.com*
[5] *Lecturer of Chemistry Departement, Mathematic and Natural Science Faculty Institut Teknologi Bandung, Bandung, 40132, Indonesia, email: rino@chem.itb.ac.id*

One type of bending tests is four-point bending test. The aim of this test is to investigate the properties and behavior of materials with structural applications. This study uses numerical and analytical studies. Results from both of these studies help to improve in experimental works. The purpose of this study is to predict steel beam behavior subjected to four-point bending test. This study intension is to analyze flexural beam subjected to four-point bending prior to experimental work. Main results of this research are location of strain gauge and LVDT on steel beam based on numerical study, manual calculation, and analytical study. Analytical study uses linear elasticity theory of solid objects. This study results is position of strain gauge and LVDT. Strain gauge is located between two concentrated loads at the top beam and bottom beam. LVDT is located between two concentrated loads.

Keywords:

steel beam, flexural properties, four-point bending, numerical, analytical

CE4A - 2

Deformation of High Performance Concrete Plate Under Humid Tropical Weather

Chatarina Niken[1], Elly Tjahjono[2], Fx Supartono[3],Laksmi Irianti[4]

This paper presents the relationship between surrounding relative humidity and temperature on deformation behavior of one full scale concrete plate with compressive strength of 60MPa. This research was done in Indonesia which is in humid tropical weather. A specimens measuring 3000 x 1600 x 150 (mm^3) were used. The behavior was obtained by using four embeded vibrating wire strain gauges (VWESG). As a result there is a very strong relationship between humidity and deformation at the age range of 7 until 21 days. The largest deformation occurs in the corner and the fluctuation of deformation in side posision is larger than in the corner and in the middle. The peaks of surrounding relative humidity were fully followed by the deepest valley of deformation on time in the corner, while in another position the range delay time was 8-11 hours. There is a strong relationship between surrounding temperature and deformation at the range of 7 until 14 days. Surrounding relative humidity faster and longer influenced concrete behavior than surrounding temperature. The influence of surrounding temperature in humid tropical weather was shorter than in non humid tropical weather.

Keywords: -

CE4A - 3

Capacity and Ductility Analysis of Externally Strengthened R/C Columns Using Steel Plates

I Ketut Sudarsana[1*], Putu Deskarta[1], Kadek Bangkit Tilem Sentosa[2]

[1]*Civil Engineering Department, Udayana University*
[2] *Alumni Civil Engineering Department , Udayana University*
[1,2]*Jln Kampus Udayana, Jimbaran, Badung, Bali, Indonesia Email : ksudarsana@unud.ac.id (*)*

Strengthening of reinforced concrete (RC) members is usually done to increase the members' capacity and ductility. An external strengthening using steel plates is one of commonly used materials to strengthen columns. This paper presents analysis results of RC columns strengthened with steel plates. The main parameter on this study is the variation of steel plate arrangement on column sides of a controlled column section (KK) which having dimension of 300 x 300 mm and longitudinal reinforcement ratio of 1.8%. Four variations of strengthening sections (KPS, KPP, KPPP and KPSP) are analyzed to obtain their capacity and ductility. The average ratio of the steel plate area to that of RC sections in all sections is 4.7%. Sectional analysis was conducted to obtain axial force- moment interactions and moment-curvature diagrams to evaluate the capacity and ductility of the column sections for considering both confined and unconfined concrete. Three models of the stress-strain diagrams for concrete used in the analysis are Hognestad model (1951), Mander et.al model (1988) and Sakino and Sun model (1994), respectively, for unconfined concrete, confined concrete by hoops and confined concrete by steel plates or tube. Analysis results shows that using the steel strengthening ratio of 4.7% can improve the column capacity and ductility significantly regardless the arrangement of the steel plate. However, the highest improvement on the capacity is given by the section with steel plate concentrate at four corner sections (KPS) and then follows by KPSP, KPPP and KPP. Comparing to the control section (KK), the curvature ductility also increases by 12% to 22% for unconfined and 38% to 46% for confined sections.

Keywords:

capacity, ductility, reinforced concrete, strengthening column section

CE4A - 4

The Optimum Percentage of as Fly Ash to Replace a Part of Cement in Producing High Strength Concrete in Hot Weather

G. Turuallo[1,*], H. Mallisa[1]

[1]*Lecturer in Civil Enginering Department, Tadulako University, Palu 94124, Indonesia*
**Corresponding: turuallo@yahoo.co.uk*

The use of waste materials in concrete gave many advantages to prove the properties of concrete such as its workability, strength and durability; as well to support sustaianable development programs. Fly ash was a waste material produced from coal combustion. This research was conducted to find out the optimum percentage of fly ash as a part replacement of cement to produce high strength concrete. The fly ash, which was used in this research, was taken from PLTU Mpanau Palu, Central Sulawesi. The percentage of fly ash used in this research to replace a part of cement were 0, 10, 15, 20 and 25% of total binder. The water-binder ratio used in this research was 0.3 selected from trial mixes done before. The results of this research showed that the strength of fly ash concretes at 28-days for the replacement levels up to 20% were similar to that of PCC concrete. Even the strength of fly ash concrete with 15% fly ash at the 28-days was 6.85% higher than that of concrete with PCC only.

Keywords:

Cementitious Materials; Sustainable Development; Fly Ash; High Strength Concrete and Workability

CE4A - 5

Ductility of Polystyrene Waste Panel

Dewi Sulistyorini[a], Iskandar Yasin[b]

[a,b]*Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia*

Polystyrene waste panel is one of alternative materials that uses polystyrene waste. It is estimated that EPS foam (or polystyrene) products accounts for less than 1% of the total weight of landfill materials, the fraction of landfill space it takes up is much higher considering that it is very lightweight. Furthermore, it is essentially non biodegradable materials, taking hundreds perhaps thousands of years to decompose. Even when already disposed of in landfills, EPS can easily be carried by the win and litter the streets or end up polluting water bodies. This experiment is to utilize the polystyrene waste as a non structural panel to be evaluated the ductility. The specimen consisted of cement 250 kg/m^3, polystyrene waste was as aggregate, water cement ratio was 0.4 and wire mesh diameter was 0.6 mm with the grid 6 mm x 6 mm placed on the top and bottom of the panels. The polystyrene panels were compressed at 2 MPa. Six specimens had dimension 80 cm length, 30 cm width and the thickness planned were two varieties, they were 0.5 cm and 1 cm. Flexural testing is used to examine load and deflection to measure the ductility. The load and the deflection showed that the maximum load for the specimen with 0.5 cm thickness is 0.4, 0.56 and 0.37. And for 1 cm thickness is 0.4, 0.36, 0.64. It shows that the thickness variation does not give effect on the maximum load. Result showed the average of Displacement Ductility Index of polystyrene waste panels with 0.5 cm thickness was 1.692 and for 1 cm thickness, the average was 4.043. So the average of the panel with 0.5 cm thickness planned is under 1.99 and the panel with 1 cm thickness planned is upper 3, therefore, it is considered imperative for adequate ductility.

Keywords:

Polystyrene waste panel, Displacement Ductility Index, Wire mesh, Deflection, the variation of thickness

CE4B - 1

Erosion and Transport Rates of Sediments at Degraded Coastal Waters in Bedono Village, Sayung Demak, Central Java

Max Rudolf Muskananfola[1,*], Haeruddin[1], Pujiono Wahyu Purnomo[1], Bambang Sulardiono[1]

[1]*Department of Aquatic Resources, Faculty of Fisheries and Marine Science, Universitas Diponegoro, Tembalang, Semarang 50277, Indonesia*

Bedono village, which lies at the coast of Demak Northern Java, is characterized by a number of rivers, estuaries with important habitats such as mangroves, and silty-clay coasts. The village has experienced severe degradations in terms of erosion and coastline changes as well as damages of houses, buildings, roads, tambaks (fishponds), and mangroves. This condition has affected the social and economic lives of local people as well as the environmental ecosystem in the area. Therefore, it is crucial to enforce coastal development and management of the affected area to restore its quality. This study is aimed to investigate erosion patterns and transport rates of sedimentsas a basis for coastal development and management. The study was conducted in December 2016 to represent west rainy season.

Sediment transport and erosion rates were examined using data of current velocity and grain size of surface sediments. Current velocity were measured using a current meter fixed at 100 cm above seadbed during high tides. Current speeds were recorded every hour during one tidal cycle at day time. Surface sediment samples were taken using a Van Veen grab for further analysis of mean grain size distribution and sediment textures in the laboratory.

The results show that friction velocities range from 0.547 1, 2 and 3. Bed shear stresses range between 0.12 Bed load sediment transport rates range between 0.164 g suspended load transport rates range between 0.015 g December west rainy season. Sediment textures in the study area are dominated by clay fractions followed by fine sands.

Keywords:

Erosion and transport rates of sediments, coastal waters, Bedono Sayung Demak

CE4B - 2

The Relationship between Specific Land Use Categories and Imperviousness for Predicting the Impact of Excessive Land Development in Urban Area at Semarang, Central Java

Dwita Sutjiningsih[1], Yosef Prihanto[2]

[1]*Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Environmental Science Programme, School of Postgraduate, Universitas Indonesia, Jakarta Pusat 10430, Indonesia*

Most researchers agree that imperviousness is the key predictive variable in simulation and empirical models used to estimate the stream quality as response variable. Therefore, the decision in selecting the imperviousness estimation method is crucial. This study aims at testing the accuracy of land use and population density methods to estimate the directly connected impervious area (DCIA) of subwatershed for predicting the impact of land development especially the flood discharge in a moderately urbanized city. The DCIA consists of rooftops and road network and elaborated based on nine land use categories on administrative- and watershed-based area inSemarang, Central Java. The digitized World View Satelite Imagery 2012 combined with in-situ observation by Geospatial Information Agency in 2013 and repeated in 2016 are used for calibration purposes. In predicting flood discharge, the land use method shows accurate results in all four cases, while the population density method shows somewhat overestimated results, especially in the area dominated by green open space, agricultural, and industrial area as well. In cases where direct measurement is impossible due to time and money constraints, the land use method is more accountable than population density method in accurately predicting the DCIA in the watershed.

Keywords:

DCIA (Directly Connected Impervious Area); Imperviousness; Land use method; Population density method; Semarang

CE4B - 3

Mapping of The Sub-Siak Watershed Based on Remote Sensing and Simulation of its Performances Based on the Swat

Sandhyavitri Ari [1], Fauzi Manyuk[1], Sutikno Sigit[1], Fajri Mardan[1*], Iqbal Muhammad[1]

[1]*Civil Engineering Department, University of Riau, Pekanbaru, 28293, Indonesia*
**ari.sandhyavitri@lecturer.unri.ac.id*

One of the deepest and important rivers in Indonesia was Siak River. The objectives of this study were to develop watershed map of sub-Siak using remote sensing (RS) Landsat ETM+ (Enhanced Thematic Mapper) images data 2002, 2007, 2012, and simulate 4 indicators performance of the existing sub-Siak watershed, Riau, Indonesia based on 2 scenarios; (i) an existing condition in 2012, and (ii) projection the condition after conservation schemes. The simulated conservation schemes may include replanting bushes and arid areas with the local vegetation such as Waru (Hibiscus tiliaceus), and Kayu Ara (Ficus sp). After conducting the simulations, it was revealed that the watershed indicators performance encompassing; (i) the percentage of vegetation coverage areas (PPV) will be better, (ii) percentage of critical land areas (PLK) will decrease, (iii) water flow regime coefficient (KRA) will improve, and (iv) annual flow coefficients (KAT) become better. The hydrological models of this watershed were developed using the Soil and Water Assessment Tool (SWAT). The hydrological model of this watershed is acceptable as the determination coefficient (R2) was 0.50 > 0.4 and NS was 0.5 > 0.36. Hence, it proves that RS data were useful to develop time series maps concerning the change of the sub-Siak watershed coverage areas in 2002, 2007, 2012, identified the magnitude of land use changes, and the SWAT may simulate the hydrological model of the watershed.

Keywords:

Landsat, Remote Sensing, Watershed Performances, Land Use Change, SWAT, Simulation, Conservation

CE4B - 4

Analysis of Flood Emergency Response Instrument in Indonesia

Toha Saleh[a]

[a]*Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

One of measures to reduce the flood impact in Indonesia has been done by flood emergency response action plan. The action plan is generated from decision making process assisted by instrument such computer models which have capability in producing scenarios and decision to be taken. This research is conducted to identify how the written procedures related to flood emergency response -delivered by international and national agencies, being accommodated by those (computer) models. By using qualitative analysis, the element procedures of an effective flood emergency response model have been reviewed. The result shows that the detailed information such human and material resources, facilities information, and warning time-lag, have not been properly and entirely accommodated in the (computer) model. Highlights are also given to propose more effective instrument to improve the management of flood crisis.

Keywords:

Flood management; flood procedurs; emergency response instrument

CE4B - 5

Dry Dams Performance on Consecutive Rainfall During Rainy Season at Upper Ciliwung Watershed

Evi Anggraheni[a], Dwita Sutjiningsih[a], Airlangga Mardjono[b] and Teuku Iskandar[c]

[a]*Civil Engineering Department, Universitas Indonesia, Depok, 16424, Indonesia*
[b]*Indonesian commision on Large Dam (Inacold), Jakarta, Indonesia*
[c]*Ciliwung-Cisadane River Basin Agency, Jakarta, Indonesia*

Jakarta is the capitol of Indonesia which located at the downstream part of Ciliwung. Flooding is a most natural hazard at Jakarta, almost every years its occur at Jakarta. Many infrastructure and researches have been done to decrease risk of flooding. Ciawi and Sukamahi Dams is one of the structural method proposed by government to decrease the peak flood through the retention capacity. That Dams will be constructed with the dry dam type which contain without gates or turbines. Bottom outlet combine with the spillway was design for Ciawi and Sukamahi dam. Dry dam is designed to hold an excess water in times of flooding and allow water to move freely in normal conditions, in the future, its can be used to sediment and water quality control also. The concept is considered a long-term and permanent flood mitigation strategy. Benefit of this dam High maintenance is required especially after the event of a flood to remove debris and sediment deposits. Dry dam inundation area must be control strictly because when the area is not properly control, its will be occupying by habitant. Win Tr 20 has been chosen as the hydrological model that will represent the Upper Ciliwung watershed behavior. The production function of its model adopt the Soil Conservation Service Curve Number as we called SCS-CN. Consecutive rainfall will be applied by the rainfall distribution on the WIN TR 20. Flood routine with consecutive rainfall compute using level pool routine combine with spillway and bottom outlet. The objective of this study is to analyze the dry dam performance when the consecutive rainfall occurs during rainy season. The initial idea from this dry dam is to prolong the time lack before flood arrived in Jakarta to give sufficient time for evacuation. First Result from simulation with single design rainfall show that the Ciawi and Sukamahi increase the time lack of flood peak into downstream.

Keywords:

Flooding Dry Dam Consecutive Rainfall; Flood Routine and Time Lack

CE5 - 1

The Drag Forces Exerted by Lahar Flows on a Cylindrical Pier: Case Study of Post Mount Merapi Eruptions

Zainul Faizien Haza

Fakultas Teknik Universitas Sarjanawiyata Tamansiswa, Jl.Kusumanegara 157 Yogyakarta, Indonesia

Debris flows of lahar flows occurred in post mount eruption is a phenomenon in which large quantities of water, mud, and gravel flow down a stream at a high velocity. It is a second stage of danger after the first danger of lava flows, pyroclastic, and toxic gases. The debris flow of lahar flows has a high density and also high velocity; therefore it has potential detrimental consequences against homes, bridges, and infrastructures, as well as loss of life along its pathway. The collision event between lahar flows and pier of a bridge is observed. The condition is numerically simulated using commercial software of computational fluid dynamic (CFD). The work is also conducted in order to investigate drag force generated during collision. Rheological data of lahar is observed through laboratory test of lahar model as density and viscosity. These data were used as the input data of the CFD simulation. The numerical simulation is utilizing the ANSYS Fluent 14.0, which provides the broad physical modelling capabilities needed to model the flow. By using the advanced post-processor, examining the results and settings, analysis can be performed in further. The numerical model is involving two types of fluid: mud and water, therefore multiphase model is adopted in the current CFD simulation. The problem formulation is referring to the constitutive equations of mass and momentum conservation for incompressible and viscous fluid, which in perspective of two dimension (2D). The simulation models describe the situation of the collision event between lahar flows and pier of a bridge. It provides sequential view images of lahar flow impaction and the propagation trend line of the drag force coefficient values. Lahar flow analysis used non-dimensional parameter of Reynolds number. According to the results of numerical simulations, the drag force coefficients are in range 1.23 to 1.48 those are generated by value of flow velocity in range 11.11 m/s to 16.67 m/s.

Keywords:

Computational Fluid Dynamic; Drag force; Drag force coefficient; Lahar flows; Numerical model

CE5 - 2

Groundwater Potential Modelling in Central Lampung using Resistivity Meter Method (Geolectric Method)

Eva Rolia[1], Dwita Sutjiningsih[2], Herr Suryantono[3]

[1]*Doctoral Program Student CivilEngineering Departement Faculty of Engineering University of Indonesia, Depok 16424, Indonesia. Email : roliaeva@yahoo.com*

[2]*CivilEngineering Departement Faculty of Engineering University of Indonesia, Depok 16424, Indonesia. Email : dwita@eng.ui.ac.id*

[3]*CivilEngineering Departement Faculty of Engineering University of Indonesia, Depok 16424, Indonesia. Email : herr.soeryantono@ui.ac.id*

Water plays a central and critical role in the life of every living creature. Thus, the presence of the groundwater should be administered properly both in its quality and quantity to fulfill the human demand. Groundwater consuming tends to increase along with the population growth rate, therefore planning and wise groundwater consuming is required to preserve and protect the water resources in the District of Bumi Ratu Nuban Central Lampung regency. The groundwater research was conducted using Geoelectric tool with Schlumberger configuration.

This study is aimed to determine groundwater movement pattern, describe recharge and discharge groundwater zone to govern groundwater conservation. But, the main points carried out in this research are to know the layer type of rock and the presence of groundwater aquifers using the Geoelectric tool Schlumberger configuration and to conduct the modeling using Ip2Win software in Bumi Ratu Nuban district areas; Bumi Rahrjo, Bumi Rahayu and Tulung Kakan with the measurement in 13 spots. Schlumberger configuration was used in this research due to its accuracy to measure under surface conditions vertically based on the resistivity value of rocks.

The study reveals that resistivity value of rocks in Bumi Ratu Nuban districts is dominated by the value between 100 -5000 Ωm. It can be assumed that thick layers of rock in this area are sand and gravel aquifers. The aquifer in this area is phreatic aquifer with the thickness of at least 3.53 m and maximum of 74.95 m. The good potential aquifier was found in Tulung Kakan and Bumi Raharjo villages. The rock layers dominated in the study area are clay, sand, sand argillaceous and sandy loam.

Keywords:

Geoelectric, Groundwater

CE5 - 3

Estimating Design Flood and Hec-Ras Modeling Approach for Flood Analysis in Bojonegoro City

Rian Mantasa Salve Prastica[1], Caya Maitri[1], Ade Hermawan[1], Pratomo Cahyo Nugroho[1], Dwita Sutjiningsih[1], Evi Anggraheni[1]

[1]*Civil Engineering Department, Universitas Indonesia, Kampus UI Depok, Postcode 16424, Indonesia*

Bojonegoro faces flood every year without any advanced prevention development. Bojonegoro city growth could not reach the high peak because flood results loss in the form of material, makes uncomfortable feeling to society, and disturbs social activities. This research aims to analyze the factor that has probability to be the main factor of flood in Bojonegoro. Flood discharge analysis uses Nakayasu synthetic unit hydrograph for period of 5 years, 10 years, 25 years, 50 years, and 100 years. They would be compared to the water maximum capacity that could be loaded by the river. According to the analysis result, Bengawan Solo River in Bojonegoro could not able to load flood discharge. Another method used is HEC-RAS analysis. The conclusion that shown by HEC- RAS analysis has the same view. It could be observed that flood water surface is more than full bank capacity elevation. To conclude, the main factor that should be noticed by government is the river capacity.

Keywords:

Flood; HEC-RAS; Nakayasu Synthetic Unit Hydrograph

CE5 - 4

Reliability of Smoothed Particles Hydrodynamics Method in Simulating 3D Fluid Flow Towards Conservation of Mass and Energy (Simulated on Constriction in a Vertical Pipe)

Betania Caesariratih Lydiana, Dwinanti Rika M, Herr Soeryantono

Departemen Teknik Sipil, Fakultas Teknik, Depok, Indonesia
E-mail : betania.caesar@gmail.com

Numerical method of modelling flow of surface water is currently evolving towards particle-based method as an alternative to grid-based method due to the difficulties and limitations of the grid based methods in simulating high velocity impact (HVI) phenomena as free surfaces, moving material interfaces, deformable boundary and large deformation based on (Liu & Liu, 2003). Particle-based method is still developing and is nearly in its mature stage, hence reliability testing is needed. The purpose of this study is to evaluate the ability of the Smoothed Particles Hydrodynamics method in simulating a 3-dimensional fluid flow through constriction of a vertical pipe. Examination of this method is done by reviewing the results based on the Conservation of Mass and Conservation of Energy. The simulations are done by using visual basic for excel as the program platform. The model used in this simulation is a square-vertical pipe with a constriction segment right in the middle of it. The scenarios on these simulations are varied by the number of particles and the value of rest density. The results from these simulations are, the value of velocity generally increases while the value of pressure decreases in the constriction segment, so that the principles of the Conservation of Energy have been fulfilled, despite in some scenarios the pressure value is altered in some segments of the constriction. The percentage difference between the particle's density with the rest density value still fluctuates even though the value of rest density has been varied. The set of particles visually expand on higher value of rest density, and is visually dense on the lower value of rest density. The results show that the Conservation of Mass has not yet been completely fulfilled. Overall, the results from some of the simulations are not stable because of the ability of the program platform. Therefore, in general, the results show that the simulation still has to be improved due to the incapability of the program platform that is not stable in doing simulation of fluid flow phenomenon. But on the other hand SPH method is able to simulate three-dimensional fluid flow through constriction of vertical pipe.

Keywords:

Smoothed Particle Hydrodynamics; 3-dimension simulation; fluid flow simulation; constriction; vertical pipe

CE5 - 5

Flood Reduction with Multiple Dams Scenario in Karang Mumus River, Samarinda

Riyan Benny Sukmara[1], Ariyaningsih[2], Nadjadji Anwar[3], Edijatno[3]

[1]*Department of Civil Engineering, Kalimantan Institute of Technology, Balikpapan 76127, Indonesia*
[2]*Department of Urban And Regional Planning, Kalimantan Institute of Technology, Balikpapan 76127, Indonesia*
[3]*Department of Civil Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, 60111, Indonesia*

Flooding issues in Samarinda have high depending on the capacity of Karang Mumus river. Considering the ability of Karang Mumus river to drain off flood discharge, there wore evidence that the constriction of River will drive to flooding issues, especially in rainy/wet season (October-April). The constriction of river happens because many people build non-permanent houses and building on the river and river banks. Flooding potentially damages to the houses, roads, and other public facilities increasingly. To cope the issue, Government of Samarinda has tried many solutions to overcome the issue by building The Benanga dam and it has been planned to build multiple Dams in Karang Mumus sub-Watershed. This paper aims to analyze the effectiveness of flood control effort using multiple dams scenario in Karang Mumus Sub-Watershed. Analyzing process including hydrology simulation, the relationship between hydrographs and rise of water level simulation in Karang Mumus River. The result of this paper shows water level when peak discharge flows out existing river bank. Analyzing result also shows that flood control scenario is effective to reducing flood discharge until fifty percent compared without existing conditions.

Keywords:

Flood, Multiple Dam, River, Samarinda

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ME

Design a New Generation of Synchromesh Mechanism to Optimization Manual Transmission's Electric Vehicle

Rolan Siregar[1,a], Fuad Zainuri [2,b], Muhammad Adhitya [2,c], Danardono .A. Sumarsono[2,d]

[1]*Department of Mechanical Engineering Universitas Darma Persada 13450,Indonesia*
[2]*Department of Mechanical Engineering Universitas Indonesia 16424,Indonesia*
[a]*rolansiregar@ft.unsada.ac.id,* [b]*fuad.zainuri@ui.ac.id,* [c]*madhitya@eng.ui.ac.id,* [d]*danardon@eng.ui.ac.id*

Fuel consumption continues to rise will cause serious problems in the future due to the limited amount of fossil fuels on earth. In addition, emissions of carbon dioxide (CO2) and carbon monoxide (CO), which is the burning of oil is very influential on global warming today. Therefore, the development of friendly technologies (green energy industry) has been started. One is the development of environmentally friendly vehicles (green vehicle) in which the battery is an energy source that pollution from vehicles is equal to zero. The design of optimal power train mechanism on electric vehicles is one of the best ways to save battery energy consumption. Transmission is one of the power trains is very influential on the performance of the vehicle. In this paper will discuss electric vehicle transmission system.

There are some major things that the reference design of the transmission that will be done is the first that the large wheel traction should have the same value as the traction conventional vehicles, and the second is the transmission model should be much simpler than the transmission of the motor fuel to meet the criteria for the use of the electric motor of the vehicle. Synchromesh is one of the constituent elements of the transmission which serves to smooth gearshift so that there is increased driving comfort. Further development synchromesh transmission is done to get a more simple construction, easily manufactured, and ease of use. Zero shift transmission is the latest development in transmission and then developed into an automatic manual transmission (AMT), where transmission has been used on racing vehicles to eliminate the current slowdown gear shift. Zero shift transmission is still relying on the clutch to change gear in which electromechanical be used to replace the clutch pedal. Therefore, the transmission is considered to be too complex for the transmission of electric vehicles, but its mechanism is considered very appropriate to increase the transmission efficiency. Starting from the transmission is then carried out new innovations transmission design for electric cars. The combination synchromesh with zero shift mechanism for manual transmission is a transmission which is ideal to increase the transmission efficiency. Installation synchromesh on zero shift mechanism is expected to replace the function of the clutch Manual Transmission (MT), and assisted with the motor torque setting when to change gear. This study displays a performance analysis of the electric vehicle transmissions.

Keywords:

Zero Shift, Synchromesh, Automatic Manual Transmission, Electric Vehicle

ME1A - 2

Optimization of Impact Energy Absorber Parameters for Automobile Crush Box Using Response Surface Method

Mohammad Malawat[1,a*] and Danardono Agus Sumarsono[1,b]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia Kampus Baru UI Depok 16424 Indonesia*
[a]*mohammad.malawat@ui.ac.id,* [b]*danardon@eng.ui.ac.id*

The Impact Energy Absorber (IEA) of an automobile provide the crush box to crumple when the collision is happening. The IEA is located on front end or rear end of automobile. Exactly, the IEA is located behind the bumper. The main functions of The IEA are to absorb any kind of energy due to collision and to protect the main structure of automobile from destruction that effects to prevent occupant fatality, distortion on battery or exploitation on fuel tank. The IEA is made from thin wall square tube where located holes as crush initiators. Three square tubes having thickness about 0.6 mm (specimen code A), 0.8 mm (specimen B) and 1 mm (specimen Code C) were tested under dynamic load. The crushing initiator is designed around the shape of the tube wall and has eight holes with a fixed diameter of 6.5 mm. For optimization, the result of experiment of the crushing initiator was determined at 3 different locations on the specimen wall. These locations are 10 mm, 30 mm, and 50 mm measured from the initial collision position of the specimen tested. There is the experiment result is going to optimized. The main aim of the research is to optimize the IEA parameter for automobile crush box. Wall thickness and crush initiators position on thin wall square tube are considered as input parameters. Sets of parameter for impact energy absorber are designed by employing Response Surface Method (RSM) in statistical software Mat lab 2016. The regression equation for impact energy absorber is developed using the experimental drop test result of different variant of wall thickness and crush initiators position of square tube as an IEA. The optimization result that the thin-walled square tube cross section 60.42; h = 0.6 mm almost complied to all optimal prediction on IEA design and crush initiators position 10 mm of from the edge of thin-walled square tube had the optimal prediction on IEA design.

Keywords:

Crush Initiators Position, Wall Thickness, Impact Energy Absorber, Response Surface Method

The Design of Connection Solid Oxide Fuel Cell (SOFC) Integrated Grid with Three-Phase Inverter

Darjat[1,2,a*], Sulistyo[2], Aris Triwiyatno[1], Humaid Thalib[1]

[1]*Department of Electrical Engineering, Diponegoro University, Semarang, 50275, Indonesia*
[2]*Department of Mechanical Engineering, Diponegoro University, Semarang, 50275,Indonesia*
[a]*dr.darjat@gmail.com*

Fuel cell technology is a relatively new energy-saving technology that has the potential to replace conventional energy technologies. Among the different types of generation technologies, fuel cells is the generation technologies considered as a potential source of power generation because it is flexible and can be placed anywhere based distribution system. Modeling of SOFC is done by using Nernst equation. The output power of the fuel cell can be controlled by controlling the flow rate of the fuels used in the process. Three-phase PWM inverter is used to get the form of three-phase voltage which same with the grid. In this paper, the planning and design of the SOFC are connected to the grid.

Keywords:

SOFC, Three Phase, Inverter, Grid, PWM

ME1A - 4

Electric Car Conversion Components Layout Arrangement and Their Effects on Center of Gravity Location

Mohammad Adhitya[1], Muchamad Aditya Rachmanto[1], Sudirja[1], Danardono Agus Sumarsono[1]

[1]*Mechanical Engineering Department, Universitas Indonesia*

This study discusses design of layout arrangement of electric car conversion. This study consists of literature, method and the results. This study focused on the arrangement of the layout of components and change in center of gravity (CG) position that affected the vehicle handling performance. Change in CG position happened as an effect of replacing the components with certain masses affected vehicle's mass distribution. The new layout was designed to accommodate batteries, electric motor, and other complementary components resulting in CG position of the vehicle that is closer to its reference point in vertical axis and to its reference point in longitudinal axis compared to the car's original CG in standard condition.

Keywords:

Vehicle's Component Layout, Electric Vehicle Conversion, Vehicle's Center of Gravity

ME1A - 5

The Vehicle Longitudinal Dynamic Simulation to Select the Optimum Gear Ratio Combination of Electric Vehicle Conversion

Mohammad Adhitya[1], Mohammad Ikhsan[1], Danardono Agus Sumarsono[1]

[1]*Mechanical Engineering Department, Universitas Indonesia*

University of Indonesia, made the electric conversion of University of Indonesia's Multi-Purpose Vehicle. The vehicle used combustion engine at first, the conversion of electric motor as a power source affects the vehicle's performance such as torque, RPM even the total weight. Refer to the performance differences, the selection of gear ratio combination will be major concern in this thesis. Using Simulation Software, the performance of the vehicle is tested in Worldwide Harmonized Light Vehicles Test Procedure driving cycle. The conclusion of the simulation stated that the gear ratio combination that is proven to be the most optimum is the combination of first gear and third gear.

Keywords:

Electric Vehicle Conversion, Gear Ratio Combination, MATLAB Simulation

ME1A - 6

A Preliminary Case Study of a Electric Commuter Bus in Universitas Indonesia

Sonki Prasetya[1], Ghany Heryana[1], Yudan Whulanza[1], Mohammad Adhitya[1], Danardono Agus Sumarsono[1]

[1]*Mechanical Engineering Department, Faculty of Engineering*
Universitas Indonesia, Kampus Baru UI Depok 16424, Jawa Barat, Indonesia

A reliable mass transport system is one of the essential indicators for the development in a country. Unfortunately higher numbers of vehicle increase air pollution as well as the greenhouse gas emission. An electric bus commuter system is an alternative solution to overcome those problems. However, not only the electric bus but also infrastructures are required to be constructed to maintain the sustainability of the commuter system. This paper discusses a case study as a part of stages in order to implement a commuter bus system in a suburban area. Observations of passenger's quantity are conducted in every bus stations. Thus, this study successfully generates a pattern of the commuter passengers in the selected region. Among the monitored bus stations, the highest number of the average onboard and off-board passengers are 18.34 and 16.44 respectively. Furthermore, the result is utilized to obtain the needed power consumption of the electric bus during the trip. The total energy consumption of the electric bus during one trip is around 550 kWh during one trip operation with minimum electric motor rated power of 160 kW. And finally, the appropriate power management schedule system can be chosen to support this commuter system.

Keywords:

Case Study, Commuter, Electric Bus, Greenhouse, Power Consumption

State of Health Estimation of Lithium-ion Batteries Based on Combination of Gaussian Distribution Data and Least Square Support Vector Machine Regression

Didik Djoko Susilo[1], Achmad Widodo[2], Toni Prahasto[2], Muhammad Nizam[3]

[1]*Department of Mechanical Engineering of Universitas Sebelas Maret, Jl. Ir Sutami No 36A, Surakarta 57126, Indonesia*
[2]*Department of Mechanical Engineering of Universitas Diponegoro, Jl. Prof. Sudharto, Semarang, Indonesia*
[3]*Department of Electrical Engineering of Universitas Sebelas Maret, Jl. Ir Sutami No 36A, Surakarta 57126, Indonesia*

Lithium-ion batteries play a critical role in the reliability and safety of a system. Battery health monitoring and remaining useful life (RUL) prediction are needed to prevent catastrophic failure of the battery. The aim of this research is to develop a data-driven method to monitor the batteries state of health and predict their RUL by using the battery capacity degradation data. This paper also investigated the effect of prediction starting point to the RUL prediction error. One of the data-driven method drawbacks is the need of a large amount of data to obtain accurate prediction. This paper proposed a method to generate a series of degradation data that follow the Gaussian distribution based on limited battery capacity degradation data. The prognostic model was constructed from the new data using least square support vector machine (LSSVM) regression. The remaining useful life prediction was carried out by extrapolating the model until reach the end of life threshold. The method was applied to three differences lithium-ion batteries capacity data. The results showed that the proposed method have good performance. The method can predict the lithium-ion batteries RUL with a small error, and the optimal RUL starting point was found at the point where the battery have experienced the highest capacity recovery due to the self-recharge phenomenon.

Keywords:

Gaussian Distribution, LSSVM Regression, RUL Prediction, Self-recharge Phenomenon

ME1A - 8

The Frequency Excitation and Cavity Shape Changes Effect to the Vortex Ring Formation of the Synthetic Jet Actuator

Harinaldi[1], Ramon Trisno[1], Dewi Larasati[1*]

[1]*Department Mechanical Engineering, Faculty of Engineering Universitas Indonesia, Kampus Baru Depok 16242*

The decreasing number of non-renewable fuel supply due to the very high use of private transportation leads many of researcher to make some innovations in order to improve the efficiency of fuel consumption.These innovations are related to the technology which analyzing the of aerodynamic drag force and the visualization of airflow that passes through the body shape transportation means. One of the technologies which can reduce the aerodynamic drag force is the application of synthetic jet actuator (SJA) as a flow active control in order to reduce the aerodynamic drag on a body of a vehicle. This research is the improvement of basic knowledge of the turbulent flow control and the aerodynamic phenomena. The purpose of this study is to analyze the performance of SJA as one of the devices for reducing the airflow separation area on the Ahmed body model. The research begins by observing the SJA characteristic in purpose to get the maximum result of its performance. The characteristic of an SJA includes the effect of the cavity shapes and orifice diameter variation. The cavities shapes that will be applied are half-sphere, tubes, and conical. The diameter of the orifice is varied to 3 mm, 5 mm and 8 mm. In order to get comprehensive results, this study will be conducted by both computational and experimental methods. By utilizing the flow rate data from the experiment and the visual analysis of flow contour from CFD simulation, the formation of a vortex ring in the SJA can be determined. Based on this research result, the formation of vortex ring occurs at the configuration B3, T3, T5, K3 and K5 of the SJA. Meanwhile, the other types of the synthetic jet cavity which have 8 mm of orifice diameter cannot produce the vortex ring.

Keywords:

Drag Force, Active Flow Control, Synthetic Jet, Airflow Separation, Ahmed Body, Vortex Ring

Comparative Resistance Test Between Two Towing Tanks (A Case Study at ITS and IHL)

Dian Purnamasari[1], I Ketut Aria Pria Utama[1], I Ketut Suastika[1]

[1]*Departement of Naval Architec and Shipbuilding Engineering, Sepuluh Nopember Institute of Technology (ITS) Surabaya*

A complete comparative tests of ITTC procedures that exist among the towing tank facilities at Sepuluh Nopember Institute of Technology (ITS) and Indonesian Hydrodynamic Laboratory-BPPT was carried out. In the resistance tests at all laboratories, the ship model is connected to the towing carriage so that it is free to trim and heave and were restrained in surge, sway, roll and yaw. Each facility uses its own instrumentation, calibration procedure and test methodology. Regarding data acquisition and signal conditioning techniques, the data sampling rate, filtering of the analog signal from the force measuring device, and the actual length of record over which the ship resistance was averaged were the responsibility of each facility. Each institution has tested the model in 4 different sessions, in order to change the test conditions and some errors were detected in the uncertainties analysis for some particular Froude numbers and in those cases the data was withdrawn and not used in the analysis. From the test results of total resistance provided by each facility, the resistance was calculated as the component of the total, for any regression analysis of experimental data to yield reasonably reliable results, the data set should be large enough and more than one test should have been made for the same experimental conditions to check the repeatability of the data. The measurements included speed (V_m) and total resistance (R_{Tm}). There is good agreement overall between the test results obtained at the two facilities. The differences that do remain should be attributed to differences in experimental techniques and types of model used at the participating laboratories.

Keywords:

Resistance Tests, Froude Numbers, Repeatibility, Speed, Total Resistance

ME1B - 2

Effects of Application of a Stern Foil on the Ship Resistance: A Case Study of Orela Crew Boat

Ketut Suastika[1,a*], Affan Hidayat[2], Soegeng Riyadi[2]

[1]*Department of Naval Architecture and Shipbuilding Engineering, Faculty of Marine Technology, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia*
[2]*PT. Orela Shipyard, Ujung Pangkah, Gresik, Indonesia*
[a]*k_suastika@na.its.ac.id*

Effects of application of a stern hydrofoil on the ship resistance are studied numerically using computational fluid dynamics (CFD) and verified using data from model tests. A 40-m planing-hull *Orela* crew boat is considered with target top speed of 28 knots (Froude number Fr = 0.73). The stern foil (NACA 64(1)212) was installed with the leading edge precisely below the transom with angle of attack of 2 degrees at elevation 0.853 T below the water surface (T is the draft). At relatively low speed (Froude number Fr <~ 0.45) the stern foil results in an increase of the ship resistance (up to 13.9%) while at relatively high speed (Fr >~ 0.55) it results in a decrease of the ship resistance (up to 10.0%). The resistance coefficient CT first increases, takes a maximum value and then decreases with increrasing Froude number. Its maximum value occurs at Fr ~ 0.5, consistent with the prediction of a resistance barier at approximately this Froude number.

Keywords:

Computational Fluid Dynamics (CFD), Planing-hull Crew Boat, Ship Resistance, Stern Foil, Towing Tests

An Investigation of Hull Form Pentamaran with Chine Model on the Resistance Characteristics

Yanuar[1], Wiwin Sulistyawati[2], Kurniawan T. Waskito[1]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Graduate Student Department of Mechanical Engineering, Universitas Indonesia, Depok 16424, Indonesia*

Several studies of multi-hulls ship showed that hull resistance could be predicted from position between the each hull. The design optimization of the hull form could be considered by minimizing resistance, which is generally the sum of the viscous resistance and the wave making resistance of the ship model. This paper presents an investigation of pentamaran hull form with chine hull form to the effects of outriggers position, asymmetry, and deadrise angles on the resistance characteristics. The investigated to the resistance characteristics by modeling pentamaran hull form using chine with symmetrical main hull and asymmetric outboard on the variation deadrise angles: 25^o, 30^o, 35^o and Froude number 0,1 to 0,7. The examined on the calm water resistance characteristics of six pentamaran models with chine-hull form by variation of deadrise angles using Ansys CFD. Increasing the deadrise angle of chine hull form contribute to the resistance due to the interaction of the wave systems produced by each demihull. Strong interaction effect on the resistance coefficient component was found for change in the hull length as well. Compared to the wigley hull form, the maximum resistance drag reduction of the chine hull form was reduced by 18.05% in deadrise 25^0, 16.1% in deadrise 30^0, and 18.19% in deadrise 35^0. While the smallest value of total resistance coefficient was generated from chine 350 at R/L:1/14 and R/L:1/7. Optimum hull form for minimum resistance has been obtained, so it is interesting to continue with angle of entrance and stem angle of hull for further research.

Keywords:

Pentamaran, Deadrise Angles, Resistance, CFD

ME1B - 4

Stack Effects on the Power Consumption in the Refrigerated Container Storage Yard

Muhammad Arif Budiyanto[1,a*], Takeshi Shinoda[2]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Indonesia*
[2]*Department of Marine System Engineering, Kyushu University, Japan*
[a]*arif@eng.ui.ac.id*

Development of green port technology has become more interested in the container port. Reduction of power consumption is one measure to reduce greenhouse gas emission has grown into appropriate strategies during their operation. Energy used in the container port are concentrated on the container handling equipment and the refrigerated container storage yard. The highest power consumption located on the refrigerated container storage yard. The electricity used to run the refrigeration machine of the refrigerated container in order to control the temperature of inside cargo. Refrigerated container are a special cargo container equipped with an integral refrigeration unit. The amount of power consumption of the refrigerated container will change depending on many external variables. Environmental factors mainly solar radiation received on the container walls caused surface temperatures increase will then affect to the power consumption. This paper provide an investigation of stacking effect on the power consumption of refrigerated containers. The investigation performed based on measurement experimentation has been conducted in Hakata Island City Container Terminal, Fukuoka, Japan. Experimentation was done during summer 2015 used three stacks of high cube refrigerated containers. Several sensor and devices are employs to catch circumstances parameters i.e. pyranometer, thermocouples, and power analyzer. Five units of pyranometer are set on a horizontal plane and vertical plane facing all cardinal direction. Thermocouples installed inside and outside of walls with the total are 20 points. On the inside walls attached 5 sensors on the middle surfaces i.e. floor, sidewall, ceiling and the center. On the outside surface attached 15 sensors each wall surfaces at the middle point including fan and compressor surfaces. Power meter employs to measure energy consumption set on the power plug station on the near of the measurement object. The parameter data from all devices recorded every minutes in the various weather conditions. From measurement data shows the stack of refrigerated container affect the distribution of surface temperature and power consumption. Stacking effects of containers provide thermal benefit on the power consumption of refrigerated container that located in the middle tier.

Keywords:

Green Port, Container Terminal, Refrigerated Container, Solar Radiation, Stack Effect

Electrical System Design of Solar-Powered Electric Water Recreational and Sport Vessel

Sunaryo[1,a], Pradhana S Imfianto[1,b], Aldy Syahrihaddin Hanifa[1,c]

[1]*Naval Architecture and Marine Engineering Study Program,*
Department of Mechanical Engineering, Universitas Indonesia
[a]*naryo@eng.ui.ac.id,* [b]*pradhana.sadhu@ui.ac.id,* [c]*aldy.syahrihaddin@ui.ac.id*

Indonesia is the world's largest archipelago with more than 17,000 islands, and the best marine tourism destination due to its beautiful beaches and underwater scenery, but Indonesia is also the most vulnerable country to be affected by climate change which is triggered by greenhouse effect in term of its geographical location along the equator. Beside industry, transportation sector is the highest contributor to the global greenhouse effect. In order to reduce the resource of greenhouse effect Indonesian Government has a strategic plan through Presidential Regulation no. 61/2011, and emphasized by the Ministry of Energy and Mineral Resources, and the Ministry of Transport in their 2015 – 2019 strategic plans for using new and renewable energy as alternative to fossil based fuel. In attempt to contribute to the Government's efforts and in advancing the national marine tourism sector, the research is aimed to design a water recreational and sport vessel that powered by solar generated electric engine. This is a further development of the solar boat created by the Universitas Indonesia team that participated in International Solar-boat Challenge competition in the Netherlands. The research is focused on the effective use of solar energy as the main source of powering the vessel's engine, and therefore the vessel is designed to the most efficient shape and dimensions obtained from various design aspects analyses. Information regarding the arrangement of the vessel, solar electric generation processes, and vessel powering system are obtained from literature study, discussion with experts, and on the spot surveys of various recreational locations. Collected data are then used as input for the calculation and simulation of the vessel being designed. The research is expected could be developed further for other usages such as fish farming, coastal fishing rig, floating restaurant etc.

Keywords:

Design, Electric Propulsion, Solar-Electric Boat, Solar Energy, Water Transportation

Optimization of Open Channel Water Tunnel Design

Ismail[1], Erlanda Augupta Pane[1,a*], Damora Rhakasywi, Eko Prasetyo, Pekik Bayu Asmoro[1]

[1]*Department of Mechanical Engineering, Faculty of Engineering,*
Universitas Pancasila Srengseng Sawah, Jagakarsa – Jakarta 12640, Indonesia
[a]*pane_erlanda@yahoo.com*

This research was conducted to develop an open channel water tunnel and analysis of the flow distribution in the test section, where geometry of the water tunnel, discharge of water flow and turbulence intensity are being basic parameters which influence Reynolds number to reach the best condition, so that the hydrodynamic found to be optimal. The previous researches of water tunnel explained that if the Reynolds number is the same fluid, the hydrodynamic on a similar model. The methods of research used numeric analysis and Computational Fluid Dynamics (CFD) simulations. The step of water tunnel design is used to determine the Area Ratio (AR) between the contraction and the test section. Area Ratio value is 5, which take it to calculate water tunnel design. Test section geometry has length is 0.6 m, width is 0.3 m, and height is 0.3 m. Pump PMP010 type is used to pass of water with various capacities. It has capacity about 900 L/min, 1000 L/min, and 1100 L/min, respectively. The optimum result is geometry water tunnel design has length inlet plenum is 0.76 m, contraction is 1.1 m included honeycombs is 0.2 m, test section is 0.6 m and outlet module is 0.51 m, So that, the total length of water tunnel design is 2.97 m. The design of water tunnel using discharge is 900 L/min; water speed is 0.167 m/s, turbulence intensity 0.044 and Froud number 0.097.

Keywords:

Froud Numbers, Hydrodynamic, Reynolds Number, Turbulence Intensity, Water Tunnel

ME1B - 7

Optimization of Container Terminal Operational Performance through Suppressing its Idle Time

Fenti Suryadi[1], Sunaryo[2*], Komarudin[3]

[1]*Mechanical Engineering Department , Universitas Indonesia,*
[2]*Mechanical Engineering Department, Universitas Indonesia,*
[3]*Industrial Engineering Department, Universitas Indonesia*

The paper is aimed on the attempt of reducing the idle time of container loading-unloading operations at the port terminal, and specifically at Tanjung Priok Port Container Terminal, as a complementary to the one being newly built just off the existing harbor complex. In the last 5 years, container shipment traffic in Indonesia has been increasing significantly. It is predicted that in 2020 container loading operational activities at Tanjung Priok Port will reach more than 10 million TEUs. Idle time is ineffective time included in the daily operation caused by several factors, such as waiting for the containers to be lifted, machines break down, changing of operators, flow of head trucks etc. By suppressing the amount of idle time in container loading-unloading operation, operational performance of terminal will be higher thus creating a better, more efficient, and faster traffic of container entering or exiting the terminal.

Keywords:

Box Crane Hour, Container, Idle Time, Port, Terminal Performance

ME1B - 8

Container Ship Accident Analysis Due to Container Stacked on Deck as an Attempt to Improve Maritime Logistic System

Gafero Priapalla Rahim[1,a] and Sunaryo[2,b*]

[1]*Department of Mechanical Engineering, Universitas Indonesia*
[2]*Department of Mechanical Engineering, Universitas Indonesia*
[a]*gaferopr@gmail.com,* [b]*naryo@eng.ui.ac.id*

This paper analyses factors that might cause accidents to the container ships due to loading conditions of containers stacked on deck, and propose applicable actions on how to minimize these factors. Container ships play important role in the domestic and international maritime logistic system as one of the most efficient ways of transporting general cargo in a bulk quantity. The number, capacity, and speed of hatch-coverless container ships worldwide have increased significantly since the latest decade. There is also trend of stacking more containers on deck in order to increase the capacity of the ships and reduce the transport costs. This phenomenon makes the number of container ship accidents also increasing continuously; especially accidents that caused ship capsize or sink. Even though every merchant ship has to comply with the applicable classification and statutory rules and regulations for the safety of the ship and its cargo, but based on the accident data have been recorded, the number of accidents still significantly high. The accidents usually cause great loses to the cargo being transported and damage the overall logistic system. The sources of container ship accidents can be categorized into: the ship itself, the environment, human factor, and management. In this study accidents data and related information were gathered through literature study, on the spot observation, and direct interviews with relevant parties. Causes of accidents were then identified by analyzing every possible source that might trigger the accident using cause and effect analysis or known also as *Fish Bone* Diagram Analysis. Based on the findings from the analysis, options for overcoming them were simulated to obtain the most applicable solutions that would minimize the accidents and improve maritime logistic system.

Keywords:

Accident Sources, Container Ship Accident, Maritime Logistic System, On Deck Stacking

Performance of Ice Slurry Generator with Mechanical Scraper Using R-22 and R-290

Fajri A. Rayhan[1], Agus S. Pamitran[1*]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Kampus UI Depok 16424, Indonesia*

Ice slurry technology is highly favored in maintaining fish freshness. Cooling capacity of ice slurry is higher than flake ice. One of the important parts in ice slurry system is the ice slurry generator. Type of mechanical scraper is the easiest type of ice slurry generator to fabricate, because mechanical scraper only uses one type material, such as stainless steel. The purpose of this research is to develop a prototype of ice slurry generator and analyze its performance. Refrigerant R-22 and R-290 were used as working fluid of the refrigeration system. The observation in this research includes the volume of ice and ability of the scraper to scrape the ice on the inner surface of evaporator. The better system has faster ice slurry generation with durability of generator to prevent freeze up in generator. Twelve variations of scraper RPM and pump RPM are adjusted to determine the quality of the generated ice. The results show that the condition of lower RPM of scraper and pump with 30 ppt salinity of sea water has shorter time of ice slurry generation.

Keywords:

Sea Water, Ice Slurry, Mechanical Scraper, R-22, R-290

Two-phase Frictional Pressure Drop of Propane with Prediction Methods of Viscosity and Density in 500 μm Diameter Tube

Sentot Novianto[1], Agus S. Pamitran[1], Raldi Koestoer[1], Kiyoshi Saito[2]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok 16424, Indonesia*
[2]*Department of Applied Mechanics and Aerospace Engineering, Waseda University, 1104, Totsuka-machi, Shinjuku-ku, Tokyo 169-8050, Japan*

The experimental study of frictional pressure drop of two-phase flow with propane on the microchannel has been done. The aim of the present research is to characterize pressure drop of evaporative propane in microchannel with 500 μm diameter and 0.5 m length. The experimental apparatus used heating process in the test section with closed loop process system. Variable of research are mass flux of 360 to 915 kg/m^{2}s and vapor quality of 0 to unity. The homogeneous and separated model used to determine the two-phase flow frictional pressure drop. Some existing correlations of two-phase flow viscosity and density used to predict frictional pressure drop, including parameter C that used non dimensional parameter of two-phase viscosity number $N_{\mu tp}$ which developed as a function of two-phase viscosity and density. The comparison of prediction frictional pressure drop showed that the Hibiki, Xuejiao and Pamitran correlation from separated model.

Keywords:

Frictional Pressure Drop, Propane, Microchannel

ME2A - 3

The Characteristic of Calcium Carbonate (CaCO3) Nanoparticles Flow Through the Pentagon Spiral Pipe

Yanuar[1], Kurniawan T. Waskito[1], Marcus A.Talahatu[1], Sealtial Mau[2], Winda Wulandari[2]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok, 16424, Indonesia*
[2]*Graduate Student Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok, 16424, Indonesia*

Nanofluid is colloidal suspension of nano sized solid particles in a base fluid. Generally, nanoparticles sources from metal and oxide material. CaCO3 were friendly to the environment and humans, it is the reason to be developed, in order can be utilized for the application in fluid transportation. The advantage of a piping system should be developed to produce more efficient flow. This study was to investigate the characteristic of calcium carbonate (CaCO3) on the flow in pentagon spiral pipe. In this experimental, the working fluid was circulated into the test pipe with constant pressure of the compressor. In this study, the working fluid was mixed of pure water with CaCO3 Nanoparticles suspension having dimension 100 nm mean diameter with the ratio 100 ppm, 300 ppm and 500 ppm. Pentagon spiral pipe with ratio P/Do 7.1 and circular pipe was used as a comparison with 4 mm inner diameter. The results show by increasing the percentage of solid particles affects the working fluid properties such as viscosity and density, and affects pressure drop and drag reduction. By increasing concentration of the nanoparticles caused higher viscosity and density of the fluid. The highest drag reduction occur in spiral pipe by 35 % for Re' 4 x 10^4 with nanofluid concentration 500 ppm and the circular pipe by 26% at the Re' 4 x 10^4. The factors determine the drag reduction are the addition of the nanoparticles. The highest DR value on the spiral pipe due to more turbulent intensity, and spiral pipe generates circumferential flow resulting fluids twisted at certain Reynolds number. The effect of change in fluid properties also take into account. It affects the damping phenomena in near wall region gives effect to friction factor reduction. Another spiral pipe benefit is preventing sedimentation of nanoparticles.

Keywords:

Calcium Carbonate, Drag Reduction, Nanofluid, Pentagon Spiral Pipe, Pressure Drop

ME2A - 4

Simple Bucket Curvature for Designing a Low Head Turgo Turbine for Pico-Hydro Application

Warjito[1], A. I. Siswantara[1], D. Adanta[1], M. Kamal[1*], R. Dianofitra[1]

[1]*Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok 16424*

Electrification ratio is a ratio between household that has access to electricity and those who don't. Reportedly, Indonesia has a 81% electrification ratio, which means that roughly 49 million people there don't have access to electricity. Indonesia's geographic condition causes many areas to have difficulty to be connected to the national electrical grid. To overcome these problems, those areas must have the capability to generate their own electricity as extending the national grid would be a costly investment. Pico-hydro has been proven to be a cost-effective solution for electrification in remote areas. The turgo's cup consists of an inlet and outlet trail with a curve that joins them. The curve in this study will be made from a simple circle arc to improve manufacturablity. Three cups were designed using basic calculation derived from the velocity triangles, each having a different circle radius that is used for cup's curve. This paper simulates the Turgo turbine performance based on the conditions of Salam Lake, Universitas Indonesia that has a head of 2.7 meter and 0.021 m^3/s flow rate, using a steady state homogenous multiphase simulation. The result shows that the Turgo turbine with the 60 mm arc radius generated 148.33 W and has an efficiency of 28.86 %, the highest compared to the other two cups that used a 50 mm and 55 mm arc radius.

Keywords:

Electrification Ratio, Pico-hydro, Turgo Turbine, CFD

Blade Height Optimization of Undershot Banki Pico-hydro Waterwheel by Analytical and Numerical Methods

Budiarso[1], A. I. Siswantara[1], D. Adanta[1], R. Pradito[1,a*], R. Dianofitra[1]

[1]*Department of Mechanical Engineering Faculty of Engineering Universitas Indonesia, Kampus Baru Depok 16242*
[a]*riandhika.p@gmail.com*

Electricity is one of the primary needs in the daily life of a modern human. It is the main type of energy to power a modern human daily needs because it is easy to use, environmentally friendly, and can be easily converted to other forms of energy. However, electricity is not evenly distributed in Indonesia, especially the rural areas due to the lack of access to the power generation. Indonesia has an electrification ratio of 84.35% in the year 2015. This data shows that there are 49 million people who do not have access to electricity. Thus, an additional pico-hydro power generation (PLTPH) to minimize the use of fossil fuels and fulfill the electrification goals set by the ministry of energy and mineral resources. Pico-Hydro power generation becomes a solution because in Indonesia there are plenty of water sources and that can be utilized. This paper is mainly focused on banki undershot waterwheel, because of the simple construction, economical, and easy to move. In addition undershot banki waterwheel is suitable for water sources that have a low head like sources that found in Indonesia. The banki Undershot Pico Hydro Waterwheel is field tested in Salam Lake Located in University of Indonesia with the head set at 2.7 meter and channels 41 l/s of water. This waterwheel is to be applied in North Bengkulu at Palak Siring waterfall which is one of the remote areas located in Indonesia. In this study undershot waterwheel straight blade has an outer diameter of 0.81 m and an inner diameter of 0.54 m with 14 blades and 2 active blades. The blade has a height of 0.135 m and a width 0.13 m. Besides that the channel was reduced from 0.15 m (pipe) to 0.13 m to fill the height of blade so the blade can rotate. This analysis was done with simulation using CFD with STD k-ε turbulence modeling. The results of efficiency and power undershot is 32% and 348.8 watts.

Keywords:

Banki Waterwheel, Electricity, Height of Blade, k-ε, Pico Hydro, Renewable Energy, Undershot

ME2A - 6

Thermo-Hydrodynamics Performance Analysis of Fluid Flow through Concave Delta Winglet Vortex Generator by Numerical Simulation

Syaiful[a], Astrid Ayutasari[a], Maria F. Soetanto[b], Ahmad Indra Siswantara[c], Myungwhan Bae[d]

[1]*Mechanical Engineering Department of Diponegoro University, Indonesia*
[2]*Aerospace Department of Polytechnic of Bandung, Bandung, Indonesia*
[3]*Mechanical Engineering Department of University of Indonesia, Indonesia*
[4]*Engineering Research Institute, Department of Mechanical Engineering for Production, Gyeongsang National University, 501, Jinju-daero, Jinju, Gyeongsangnam-do, 660-701 Korea*

Numerical simulation of heat transfer and the pressure drop characteristics was carried out on the airflow through the rectangular channel mounted vortex generator. Vortex generator was mounted on a plate that was attached to the heater. Inlet velocity of airflow was varied between 0.4 to 2.0 m/s. Vortex generators used in this study was concave delta winglet pairs (CDWPs) with the attack angle of 30° and the variation of the number of rows of one pair, two pairs, and three pairs. CDWPs are predicted to produce the longitudinal vortex which increases the intensity of turbulence resulting in better mixing of flow. Better mixing of flow can improve the heat transfer between plate surface and airflow in the rectangular channel. The results showed that the installation of CDWPs vortex generator overall increases heat transfer performance. However it has consequences of higher pressure drop. Based on the variation of the number of rows, the more the number of pairs of vortex generator led to increasingly convection heat transfer coefficient (h) in both laminar and turbulent flows. h value based on the number of row of CDWPs one pair, two pairs, three pairs increases of 65.9% - 108.4%; 34.4% - 71%; and 42.2% - 110.7% compared baseline, respectively. The more the number of rows of vortex generators led to increasingly value for the pressure drop in laminar and turbulent flows. Percentage increase in pressure drop for CDWPs one pair, two pairs, and three pairs of the baseline is 70.1%-92.1%; 123.6%-161.3% and 180%-266.9%, respectively.

Keywords:

Vortex Generator, Concave Delta Winglet, Convection Coefficient of Heat Transfer, Longitudinal Vortex, Pressure Drop

Numerical Analysis of Plunging and Pitching Tandem Flapping Foil Power Generation

Michael Joevian[1]. Christopher Susanto[1], Sheila Tobing[1], Harjadi Gunawan[1]

[1]*Atma Jaya Catholic University of Indonesia, Jl. Jend. Sudirman No.51, RT.5/RW.4, Karet Semanggi, Setia Budi, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta 12930, Indonesia*

In the past two decades, numerous studies on flapping wing motion have been conducted. These studies were inspired by the flapping motion of natural flyers: birds and insects. The flapping wing motion of natural flyers utilizes unsteady aerodynamic mechanisms such as leading-edge vortices (LEVs), spanwise flow and rapid rotation at end-of-stroke to generate lift and thrust at low Reynolds number regime. The study of flapping wing motion was mainly driven by the potential applications in the design and development of micro air vehicles (MAVs). In the more recent years, the application of flapping wing motion for power generation has been gaining more attention due to the need in replacing fossil fuel with renewable energy. In a conventional system of power generator, a rotary turbine drives a generator to produce power/electricity. The same mechanism is applicable for turbine blades that flap under a combined pitching and plunging motion, also known as flapping foil generator/turbine. Flapping foil generators were studied for their potential in extracting tidal/sea wave energy. The objective of this study is to study the effects of pitching frequency on the propulsion of flapping foil generator. The numerical analysis shows that the highest lift coefficient is produced by the airfoil with 35º pitch amplitude. Although the highest pitch amplitude of 60° gives the highest power coefficient in tandem configuration, but the drag is substantially higher and the lift drops significantly even lower than the lowest pitch amplitude case of 10°. The lowest pitch amplitude does not produce much power and lift, therefore future research can be directed towards the higher pitch amplitude range.

Keywords:

Flapping Foil, Foil Power Generation, Leading-edge-vortex, Pitching-and-plunging, Tandem Airfoil

ME2A - 8

Pipes Outlet Directions and Diameter of Double U Pipes Configuration on Centrifugal Reaction Pump

Budi Setyahandana[1], Y.B. Lukiyanto[1,a], Rines[1]

[1]*Mechanical Engineering, Sanata Dharma University;*
Paingan, Maguwoharjo, Depok, Sleman, Yogyakarta 55282; Indonesia
[a]*lukiyanto@usd.ac.id*

Centrifugal reaction pump is simple centrifugal pump, easy to built, highly local components and operate at very low shaft speed. Experiment study of double U configurations pipes with three outlet directions and pipes diameter of outer arms effects were carried out for centrifugal reaction pump at very low shaft speed. The outlet directions of double U configurations were 90 deg., 0 deg. and -90 deg. from horizontally straight arm pipes. T-junction fitting, a vertical inlet pipe and two horizontally straight arm pipes as main components of the pump were 18.5 mm diameter. The horizontally straight arm pipes are similar with pump impeller function. The arm pipes are replaceable with 22.5 and 28.0 mm. The pump was rotated with vertical pipes as an axis by adjustable speed electric motor at the top of T-junction. The shaft speeds were 70 rpm up to 150 rpm. Total head and diameter of the pump were 665 mm and 1000 mm. The experiment showed that double U configurations with various outlet directions could be used to replace orifices and springs as moving components of centrifugal reaction pump. The experiment resulted performance of the three configurations and backward-inclined-blades-like as the best configuration and is followed by forward-inclined-blades-like and straight-blades-like configurations respectively. Increasing pipes diameter of the arm increase the pump capacity and does not tend to increase the efficiency.

Keywords:

Centrifugal Reaction Pump, Low Shaft Speed, Double U Pipes Configuration, Outlet Direction, Arm Pipes Diameters

ME2A - 9

Comparison between Airfoil Profiled Blade and Ordinary Blade in Cross-flow Turbine Using Numerical Simulation

Warjito[1], A.I. Siswantara[1], D. Adanta[1], A.P. Prakoso[1,a*], R. Dianofitra[1]

[1]*Department of Mechanical Engineering Faculty of Engineering Universitas Indonesia, Kampus Baru Depok 16242*
[a]*riandhika.p@gmail.com*

Isolated rural area makes on-grid electrification development becomes expensive and inefficient. For rural area with quite torrential river flow, it is recommended to build runof-river pico-hydro power plant for their mini-grid power system to produce enough electricity for small village with low investment cost. Cross-flow Banki turbine is well known for its simplicity of shape, design, and construction. Thus, the construction cost of this type of turbine is very low rather than another turbine like propeller and Pelton. Moreover, it also makes cross-flow Banki turbine easier to maintain, moreover this turbine has self-cleaning ability. Furthermore, cross-flow Banki turbine is well known for its independent efficiency from fluctuation of water discharge. Beside of many advantage on this turbine, cross-flow Banki turbine efficiency is relatively lower than another turbine. The drag force usually present when water flowing around immerse body, like turbine blade because of eddy formation. This force usually reduces the turbine efficiency. Airfoil profiles are proven to reduce eddy formation in water flow around immerse body like turbine blade then increase some turbine efficiency. This study aim to investigate the effect of NACA airfoil in blade profile to the cross-flow turbine efficiency. NACA-6712 airfoil profile was chosen because it has bigger lift coefficient than others. In this study, the turbine with NACA-6712 airfoil profiled blade cross-flow turbine has been compared with ordinary one by using CFD simulation. This study use 2.7 m head and 0.04 m3/s of water discharge. ANSYS FLUENT 17 with k-epsilon turbulence model is used in this study. As a result, CFD simulation found that maximum efficiency of ordinary blades turbine is 77.6% with number of blades 45. While, the maximum efficiency of NACA turbine is 74.9% with 50 blades. From the results, it can be obtained that the ordinary turbine is better than NACA turbine.

Keywords:

Rural Area, Power Plant, Pico-Hydro, Turbine, Cross-flow, Airfoil

Drying Phenomena of Indonesian Peat

Pither Palamba[1], Mohamad Lutfi Ramadhan[1], Engkos Achmad Kosasih[1], Yulianto Sulistyo Nugroho[1,a*]

[1]*Department of Mechanical Engineering, Faculty of Engineering University of Indonesia, Depok 16424, Indonesia*
[a]*yulianto@eng.ui.ac.id*

Indonesia has the largest peatland in the tropical region that are scattered mainly in Sumatera, Kalimantan, and Papua. Peat is an organic substance which is highly combustible in dry conditions. Dried peat could easily burnt and spread vertically and laterally along peat layers. In Indonesia, peat fires often occur in recent decades. Besides influenced by the amount of the organic content, smoldering fires of peat is also effected by the drying rate, pyrolysis, and heterogeneous oxidation in the peat surfaces. Peatland fires is one of the biggest wildfire which has damaged the ecosystem and produce hazardous combustion products into the atmosphere. In contrast to flaming fire that has been widely studied, the smoldering fires of peat are still lack of understanding. The contribution of drying kinetics of peat on the peat fires phenomenon, are important mechanisms to be studied, so these could provide a complete understanding for the process of peat fires. So far, major works on peat fire related publications concern on the pyrolysis and combustion stages. The objectives of this paper are to study the isothermal and thermogravimetric drying kinetics analysis of peat. Peat sample used was taken from Papua, Indonesia. The isothermal test was conducted using Shimadzu MOC63u Moisture Balance Analyzer with 0.001 mg accuracy. At a certain time interval the weight of the specimen was measured until it reached a constant weight of less than 0.05% changes of moisture content. Isothermal analysis was conducted by moisture analyzer of each peat at setting temperatures of 60,70, 80, 90, 100, and 110℃. The results showed that the activation energy from the isothermal measurement and thermogravimetric test were 32.83 kJ/mole with the constant of reaction rate, k = 0,0137 sec-1.

Keywords:

Peat, Drying Phenomena, Effect of Temperature, Mass Loss, Moisture Content, Activation Energy

ME2B - 2

Modelling of Smoke Control in Underground Car-park Fire

Beline Alianto[1], Nabilla Astari[1], Darendra Nareshwara[1], Yulianto S. Nugroho[1,a*]

[1]*Department of Mechanical Engineering, Faculty of Engineering University of Indonesia, Depok 16424, Indonesia*
[a]*yulianto@eng.ui.ac.id*

Smoke is the real threat in enclosed underground car-park and also a significant issues and very critical for fire fighter dealing with fire. Special attention should be paid on fire safety, especially for those with multiple occupancies and multi-layer of floors underground which can be found in many building nowadays. It is likely that a small fire accident in a basement might be turned into disasters with severe human deaths and injuries as well as property loss. During basement fire, it is crucial to win the time for occupant evacuation. The study is useful to analyse evacuating and controlling fire during emergency mode. A model of the smoke movement in basement was established using FDS 6.0 software based on similarity theory. It is also possible to supply fresh air to the path of the evacuation so that occupants will not breathe into the poison gases. The main factor that determines the smoke layer height in smoke control in well-ventilated condition was controlled by the proper sizing of HVAC fan in the basement. HVAC fans are normally run at higher capacity in fire mode than normal. Fan operations can control heat change and smoke conditions and change the air flow directionally so that it is possible to make the evacuation passage safer during fire. In this paper, the study of smoke temperature, air movement and visibility have been compared under different the fire situations. The smoke control strategy is then investigated under different HVAC operation. Simulation results show the temperatures at the fire room exit for different supply air quantities. Results also show that smoke propagation method is affected by air supply and smoke exhaust system.

Keywords:

Smoke, Visibility, Evacuation, HVAC Fans

How Appropriate are Pyridinic Carbon Nitride Nanotubes for Hydrogen Storage? Molecular Thermodynamics Analysis

Supriyadi[1,a], Nasruddin[2,b], Engkos A. Kosasih[2,c], I. A. Zulkarnain[3,d], Budhy Kurniawan[4,e]

[1]*Department of Mechanical Engineering Faculty of Industrial Technology, Universitas Trisakti, Jakarta 11440*
[2]*Department of Mechanical Engineering Faculty of Engineering University of Indonesia, Depok 16424*
[3]*Faculty of Engineering Presiden University, Cikarang, Indonesia 17550*
[4]*Department of Physics Faculty of Mathematics and Natural Sciences University of Indonesia, Depok 16424*
[a]*supriyadins@gmail.com,* [b]*nasruddin@eng.ui.ac.id,* [c]*kosri@eng.ui.ac.id,* [d]*ihsan.a.zulkarnain@gmail.com,*
[e]*bkuru07@gmail.com*

One of many efforts to enhance hydrogen adsorption capacity in a Single-Walled Carbon Nanotube (SWCNT) is through optimation and modification of the structure until material with new characteristic, or a brand new material is obtained. New material type that is attracting attention nowadays are Boron Carbide, Boron Nitride and Carbon Nitride. In this research, model of structure that will be discussed is Single-Walled Carbon Nitride Nanotube (SWC_3N_4NT) that is beginning to be discussed recently for hydrogen storage application. From semi-empiric study, optimum SWCNT diameter for storing hydrogen is on diameter below 5 Å or on diameter between 12 – 14 Å. From that result, hydrogen storage simulation is done next on (SWCNT) and SWC_3N_4NT on chirality (18, 0). This chirality is chosen to guarantee three dimensionel symmetrical characteristic. The most important thermodynamical analysis to be done is calculating SSA value and in various material model, SSA value being obtained consecutively is 2600 and 2730 m^2/g. Therefore, it can be alleged that structure modification with nitrogen substitution on carbon-based material will enhance hydrogen adsorption capacity. That modification also identifying enhancement of hydrogen adsorption energy significantly from 1.2 to 1.97 kcal/mole. Molecular dynamics (MD) simulation is resulting in adsorption capacity in temperature and pressure 120 atm consecutively 1.59 and 2.17 wt% in room temperature. In temperature 233 K, it increases to 2.26 and 2.96 wt% and also 6.1 and 6.84 wt % in temperature 77 K. To verify the simulation result, comparison is being done with semi-empiric calculation and isothermal model regression. MD result is also quite similar with isothermal adsorption model by Langmuir, Sips and Toth with determinant coefficient value above 0.99 in temperature 298 K, above 0.95 in temperature 233 K and above 0.85 in temperature 77 K.

Keywords:

Adsorption Capacity, Hydrogen, Molecular Dynamics, SWCNT, SSA

ME2B - 4

Investigation of Co-gasification Characteristics of WC Pellet and Rice Husk Mixtures in a Downdraft Fixed Bed Gasifier

Apri Wiyono[1,a*], Titi Puspita Sari Ika Pratiwi[1], Cindy Rianti Priadi[2], Adi Surjosatyo[1,b]

[1]*Department of Mechanical Engineering, University of Indonesia, 16424 Depok, Indonesia*
[2]*Department of Environmental Engineering, University of Indonesia, 16424 Depok, Indonesia*
[a]*apri.wiyono@ui.ac.id* , [b]*adi.sur@eng.ui.ac.id*

Demand for energy continues to increase, in line with the rate of population increase is always followed by the rate of landfill waste. Where the greatest percentage derived from organic waste, it could potentially be used as a raw material for the biomass mix of emission reduction efforts on the conversion of fuel from waste energy. The main objective of this paper is to study the characteristic of co-gasification, mainly gasification temperature, lower heating value and gas emission, on the performance of the biomass gasification process in a downdraft fixed bed gasifier. In this study, organic waste is used twigs, coconut fiber and rice husks in pelletization as a raw material in combustion technology with downdraft gasifier. The method is performed by co-gasification technique between WC (wood-coconut fibers) pellets and rice husk on the composition of 100% pellet, (75%: 25%) and (50%: 50%). Where the test syngas was measured directly on the burner with the type TCD gas chromatography Shimadzu 8A. Distribution of heat in the reactor at the highest temperature values obtained gasification composition pellet WC: rice husk (100%) on the T2400, then the two other compositions at the same time T1800. Meanwhile, heat distribution at the burner highest temperature values obtained in the gasification composition pellet WC: rice husk (100%) on the T3600, composition (75%: 25%) on the T3000 and composition (50%: 25%) on the T2400. It is indicated, the propagation of heat and fuel reactivity that occurs in the composition of the pellets WC: rice husk (100%) faster than other compositions. However, ignition combustion of composition pellet WC: rice husk (100%) occurs more slowly compared to other compositions. Lower heating value obtained highest gasification pellet composition WC: rice husks (75%: 25%) was 7840.37 kJ / Nm3. It was influenced by the levels of CO in the process of biomass gasification, where the higher the levels of CO, the greater the lower heating value. Gasification composition pellet WC: rice husks (50%: 50%) have the highest H2, where the three variations range from 8.31 to 11.98%. Gasification composition pellet WC: rice husks (75%: 50%) have the highest levels of CH4, where the three variations range from 0.89 to 1.18%.

Keywords:

Biomass, Pelletization, Co-gasification, Downdraft Gassifier, Gas Emissions

ME2B - 5

A Review on Liquids Collection System Improvement Process for Producing Liquid Smoke

Nasruddin A. Abdullah[1], Nandy Putra[1,a]*, Imansyah Ibnu Hakim[1], Raldi A.Koestoer[1]

[1]*Heat Transfer Laboratory, Department of Mechanical Engineering, Universitas Indonesia, Kampus UI Depok 16424, Indonesia*
[a]*nandyputra@eng.ui.ac.id*

Liquid smoke can be produced by using pyrolysis process. Biomass as raw material is heated in pyrolysis reactor to generate pyrolysis vapor. The pyrolysis vapors coming from the reactor were condensed in liquid collection system to produced liquid smoke. Liquids collection system is a device to convert smoke into liquids. Liquid smokes usually also called bio-oil, which is widely used as fuel, preservative and as other chemical substances. The objective of this paper is to provide the latest information on improvement in the liquid collection system from existing journal and conclude with some inputs and application strategies. Studies were performed using the product parameters, equipment, and operational conditions referring to the existing journal. By using a proper liquid collection system would give a better result in the liquid process.

Keywords:

Liquid Smokes, Bio-oil, Pyrolysis, Liquid Collection System, Biomass

ME2B - 6

The Comparison of Performance of Dimethyl Ether and Diesel Fuel B-20 Dual Fuel System on Diesel Engine Direct Injection System

Cahyo Setyo Wibowo[1,a], Maymuchar[1], Dimitri Rulianto[1], Faqih S.[1]

[1]*Researcher, Fuels and Aviation Groups,*
Research and Development Centre For Oil and Gas Technology,"LEMIGAS" Indonesia
[a]*cahyoswibowo@gmail.com*

DME application can include multiple sectors, among others: the transport sector, domestic/ household, power generation, but when used as a fuel substitution for diesel engine, modification will be required to the fuel line system. The purpose of this research was to compare the performance of DME as a fuel substitution for diesel oil by applying dual fuel system with B-20 (diesel fuel 80% mix biodiesel 20%) in a diesel engine direct injection system with the B-20 performance. Methodology used is testing the characteristics of DME fuel, diesel fuel (B-0) and B-20. Preparation was done by installing the fuel channel of DME with dual fuel system on the 4-cylinder diesel engine direct injection system. The performance test was done on electricity generator set with load bank and subsequent analysis was done on all assay results.

This research shows that DME fuel on the type of diesel engine with dual fuel system can be used directly if the modification made to the fuel line system. The dual fuel system of diesel fuel and DME on approximately 80% - 20% were able to generate power equal with a diesel engine that use B-20. Utilization of DME as a fuel for diesel engines can reduce emissions in term of opacity in a range of 10% - 20%, thus improving environmental concern.

Keywords:

DME, Diesel Fuel, B-20, Diesel Engine, Dual Fuel System

ME2B - 7

Energy and Exergy Analysis of Mount Salak Geothermal Power Plant Unit 1-2-3

Bakhrul Ulum[1,a], Ervan Ambarita[1], Nurrohman[2], Yogi Sirodz Gaos[2]

[1]*Gunung Salak Geothermal Power Plant, PT. Indonesia Power Bogor, Indonesia*
[2]*Mechanical Engineering Department Ibn Khaldun University Bogor, Indonesia*
bakhrul.ulum@indonesiapower.co.id

Excellent skilled operation has always been an important role to achieve a continuous operation of geothermal power plant beside its geothermal resource. Mount Salak geothermal power plant unit 1-2-3 have constantly produced not less than 180 MWe to Java-Bali grid since its first commercial operation in 1994 with high quality equivalent availability factor (EAF) average of 96%. From power plant perspective, in term of sustainability production of electricity due to its long operation period, improvement of power plant efficiency must be the main concern. Energy and exergy analysis can be performed to describe the amount of energy that is used in power plant at latest condition, and to determine the overall system losses. Research was done by taking data in the field such as temperature, pressure, and mass flow rate. Data were analyzed using analysis of the control volume to assess the thermal and mass balance to get the value of exergy. Analysis was done theoretically and compared with the results of calculation of Engineering Equation Solver (EES) software. The results showed that from 1069.90 MWe energy from steam that entering the system, the total amount of exergy was 302.42 MWe. Mount Salak geothermal power plant unit 1-2-3 had an overall first law efficiency of 16.75% and an overall second law efficiency of 59.27%. The largest losses of exergy were on the condensers, i. e. 27.84% of total exergy. That condition was obviously caused by the quality of cooling water entering condensers which was also caused by cooling tower performance. It is suggested that the turbine unit 1 should be investigated further to determine the cause of the condition where unit 1 is not able to produce as maximum capacity.

Keywords:

Efficiency, Energy, Exergy, Geothermal Power Plant, Losses

ME2B - 8

Visualization of Water Flow Phenomenon in Hydraulic Ram Pump Working Cycle by Different Color Dyes Injection

Made Suarda[1,2], I Gusti Bagus Wijaya Kusuma[1,a], Made Sucipta[1], and Ainul Ghurri[1]

[1]*Department of Mechanical Engineering, Udayana University, Kampus Bukit Jimbaran Badung-Bali 80362, Indonesia*
[2]*Doctoral Student of Engineering Science, Udayana University, Denpasar, Bali 80225, Indonesia*
[a] *wijaya.kusuma@unud.ac.id*

Hydram (hydraulic ram) pump structure is simple. It consists of two moving parts. They are waste or impulse valve and delivery valve. However, interaction of all elements of hydram pump system influence each other. This causes a comprehensive understanding of its operation becomes complex. Moreover, a detailed description of this hydram pump has not been well understood. Hence, numerical analysis or simulations of hydram pump model that has been done has not been able to describe accurately its phenomena. Therefore, a precise design and mathematical calculations of the hydram pump has not been establish until now, thus making it still depends on the assumption based on preciding experiences. In order to get the hydram pump designs, it needs to recognize comprehensively the water flow phenomenon that take place in the hydram pump working cycles. Therefore, visualization of the water flow characteristic in the hydram pump is done by constructing a hydram pump model using a transparent material that is acrylic. In this study, the water flow phenomenon in hydram pump system is visualized experimentally by three different color dyes injection method. Then, video and pictures recorded for investigating the water flow phenomena in hydram pump working cycle which includes acceleration, compression, delivery and recoil steps. This work was introduced for the first time and used to investigate water flow phenomenon in the along flow line of the pump. The results show that the water flow characteristic at every step of the hydram pump working cycle have been investigated. These results are very useful in well understanding of the working principle of hydram pump, and in developing further analysis and simulation works.

Keywords:

Dyes Injection, Flow Phenomenon, Hydraulic Ram, Visualization

ME2B - 9

Mathematical Modeling – The Impact of Cooling Water Temperature Upsurge on Combined Cycle Power Plant Performance and Operation

Ahmad Indra Siswantara[1,a*], Hariyotejo Pujowidodo[2], Asyari Darius[3], Gun Gun Ramdlan Gunadi[4]

[1]*Department of Mechanical Engineering, University of Indonesia, Depok 16424, Indonesia*
[2]*Centre for Thermodynamics, Engine, and Propulsion, BPP Teknologi, Serpong 15314, Indonesia*
[3]*Mechanical Engineering Department, University of Dharma Husada, Jakarta, Indonesia*
[4]*Mechanical Engineering Department, State University of Jakarta, Depok 16424, Indonesia*
[a]*a_indra@eng.ui.ac.id*

This paper presents the mathematical modeling analysis on cooling system in a combined cycle power plant. The objective of this study is to get the impact of cooling water upsurge on plant performance and operation, using Engineering Equation Solver (EES™) tools. Power plant installed with the total power capacity of block#1 is 505.95 MWe and block#2 is 720.8 MWe, where sea water consumed as cooling media at two unit condensers. A basic principle of analysis is heat balance calculation from steam turbine and condenser, concern to vacuum condition and heat rate values. Based on the result shown graphically, there were impact the upsurge of cooling water to increase plant heat rate and vacuum pressure in condenser so ensued decreasing plant efficiency and causing possibility steam turbine trip as back pressure raised from condenser.

Keywords:

Cooling Temperature, Condenser Vacuum, Heat Rate, Power

Effect of the Air Mass Flow Rate on the Distribution of Solids in the Circulating Fluidized Bed Boiler Using CFD Simulations

Asyari Daryusa[2], Ahmad Indra Siswantara[1*], Budiarso[1], Gun Gun R. Gunadi[1,3], Hariyotejo Pujowidodo[1,4], Candra Damis Widiawaty[3]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Depok, Indonesia*
[2]*Department of Mechanical Engineering, Universitas Darma Persada, Jakarta, Indonesia*
[3]*Department of Mechanical Engineering, Politeknik Negeri Jakarta, Depok, Indonesia*
[4]*Badan Pengkajian dan Penerapan Teknologi (BPPT), Indonesia*

The purpose of the study is to investigate the effects of air mass flow rate on the optimum distribution of solid phase. The CFD simulations used the Eulerian (granular) model to calculate the motion of particles and the standard k-ε turbulence model to simulate the fluid flows. The simulations were carried out using six different air mass flow rates based on the excess air of the reactions. The air mass flow rate influenced the distribution and the velocity of solid phase, and also the pressure difference of gas inside the boiler. The results showed that the excess air between 10% - 20% gave the optimum results.

Keywords:

Circulating Fluidized Bed Boiler, Excess Air, Distribution of Solid, CFD Simulations

ME2C - 2

Modeling and Simulation CFD Analysis for Flow in Economizer Hopper

Gun Gun Ramdlan Gunadi[1,2,a], Ahmad Indra Siswantara [1,b], Budiarso[1,c], Asyari Daryus[1,3,d], Hariyotejo Pujowidodo[1,e]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Depok, Jawa Barat, Indonesia (16424)*
[2]*Department of Mechanical Engineering, Politeknik Negeri Jakarta, Indonesia (16424)*
[3]*Department of Mechanical Engineering. Universitas Darma Persada.*
Jl. Radin Inten II (Terusan Casablanca) Pondok Kelapa
[a]*gun2rg@gmail.com,* [b]*a_indra@eng.ui.ac.id,* [c]*budiarso@ui.ac.id,* [d]*asyari@yahoo.com,*
[e]*hariyotejo.pujowidodo@gmail.com*

Increasing the mass of fly ash accumulation of coal ash in the electrostatic precipitator (ESP) and corrosion and erosion of the IDF, ESP, Air Pre Heater, because the system does not use an economizer hopper that can hold most of the fly ash. Therefore, the study of engineering design economizer hopper and ash distribution system becomes important. As an initial analysis, numerical simulation has more advantages in saving time and costs compared with experiments. Variations in flow conditions and geometry can be adjusted easily to get results. Modeling and Simulation CFD on economizer hopper aims to analyze the flow of particulate fly ash in the flue gas stream at the economizer hopper. Modeling and Simulation CFD process for flow analysis on economizer hopper is done by CFDSOF (r) software using the three-dimensional geometry model with turbulent flow model of the standard (STD) k-ε multiphase Eulerian. Economizer inlets, is Gas = 2.1 m / s and Particulate = 1 m / s. The results of modeling and simulation CFD calculations on economizer hopper indicate that the installation of economizer hopper significantly reduces the amount of particulate fly ash in the flue gas stream. At the time of inception, the particulate deposition rate highest 27%. Over time, the particulate deposition rate will drop due to the deposition of particulate matter on each hopper. The particulate deposition rate at 6 economizer hopper A began to stabilize in 11:25 - 25.00 hours, amounting to 6% to 5%.

Keywords:

Numerical Simulation, CFD, Particulate, Fly Ash, Geometry, Economizer Hopper

ME2C - 3

Open Flume Pico-hydro Turbine Blade Design by Analytical and Numerical Method

Budiarso[1], Ahmad Indra[1], Dendy Adanta[1], Hans Vohra[1,*], Reza Dianofitra[1]

[1]*Department Mechanical Engineering, Faculty of Engineering Universitas Indonesia, Kampus Baru Depok 16242*

Bengkulu is a province located in southwest coast of Sumatera, Indonesia. Bengkulu is quite underdeveloped when compared to other provinces in the country. The electrification ratio is as low as 51% in the region. The geographical condition of the region which includes mountains and hilly areas has contributed more to the difficulty in expanding the national grid. The lack of infrastructure such as roads have made the problem worse. As a result, the cost of expanding the national grid becomes high. Due to this condition, the only option left is to build off grid systems. Fortunately, there are many water sources in Bengkulu and the energy potential is high. With all these information, it can be concluded that a pico-hydro system is the right one to be developed. Selecting the right turbine for the right environmental conditions is therefore important as this will have a huge impact on the power output. Many studies have proved that the propeller type open flume turbine is the best choice for remote areas in Indonesia. The area that is focused on has a head of 2.7 m and flow rate of 0.041 m3/s. The right blade configuration is required to produce turbine with the best efficiency. This study compares turbine having different blade numbers i.e. 5 and 6 bladed turbines. In the design stage the blade number is kept as the free variable while the others are kept fixed. This ensures that the blade number is the only factor that influences the differences in the results that are obtained. Analysis was done with simulation using CFD. The turbulence parameter taken is STD k-ε. CFD simulation results showed that the greatest hydraulic efficiency is generated by the 6 bladed turbine and thus it is the right choice.

Keywords:

k- ε, Open Flume, Pico-Hydro, Runner, Rural Area

ME2C - 4

Optimize The Water Volume in The Buckets of Pico Hydro Overshot Waterwheel by Analytical

Warjito[1], D. Adanta, P[1]. Saputra[1*], R. Dianofitra[1]

[1]*Department of Mechanical Engineering Faculty of Engineering Universitas Indonesia, Kampus Baru Depok 16242*

Indonesia is a developing country where electricity is not evenly distributed in the entire region even though electricity is the primary need of everyone living in the 21st century. Rapid economic growth phenomenon gives rise to Indonesia's energy consumption, including electricity needs. In Bengkulu, there are as many as 670 from 1356 villages that do not have access to electricity due to the high cost needed in the set up. Pico hydro power plant is a renewable energy that has the capacity criteria below 5KW. Pico hydro has many advantages such as the size is applicable to places which can be applied to remote areas in Arga Makmur subdistrict, North Bengkulu. By utilizing Palak Siring in North Bengkulu as an energy source. It plays an essential role in being the solution of electrifying the ever changing and evolving urban community with its challenges such as energy depletion. This study is focused on the development of turbine overshot waterwheel, because it can provide highest efficiency at low flow rate. This paper contains information about designing a overshot waterwheel as per the conditions of the Palak Siring waterfall by scaling them first on the condition at Salam Lake Universitas Indionesia, Depok, Indonesia. On a smaller scale, with H = 1.15 m and Q = 0.041 m^3/s. The research method involved analytical by calculating the volume and the center point of mass of each bucket to determine the torque and power output. The result shows that the overshot waterwheel is already optimum for the condition, it was developed with 305 Watt power and 28% efficiency.

Keywords:

Overshot, Pico Hydro, Remote Area, Waterwheel

ME2C - 5

Comparison between Airfoil NACA-6712 Profiled and Ordinary Blade in Cross-flow Turbine by Numerical Simulation

Warjito[1], A.I. Siswantara[1], D. Adanta[1], A.P. Prakoso[1,a*], R. Dianofitra[1]

[1]*Department of Mechanical Engineering Faculty of Engineering Universitas Indonesia, Kampus Baru Depok 16242*
[a]*ajipp13@gmail.com*

Isolated rural area makes on-grid electrification development becomes expensive and inefficient. For rural area with quite torrential river flow, it is recommended to build runof-river pico-hydro power plant for their mini-grid power system to produce enough electricity for small village with low investment cost. Cross-flow Banki turbine is well known for its simplicity of shape, design, and construction. Thus, the construction cost of this type of turbine is very low rather than another turbine like propeller and Pelton. Moreover, it also makes cross-flow Banki turbine easier to maintain, moreover this turbine has self-cleaning ability. Furthermore, cross-flow Banki turbine is well known for its independent efficiency from fluctuation of water discharge. Beside of many advantage on this turbine, cross-flow Banki turbine efficiency is relatively lower than another turbine. The drag force usually present when water flowing around immerse body, like turbine blade because of eddy formation. This force usually reduces the turbine efficiency. Airfoil profiles are proven to reduce eddy formation in water flow around immerse body like turbine blade then increase some turbine efficiency. This study aim to investigate the effect of NACA airfoil in blade profile to the cross-flow turbine efficiency. NACA-6712 airfoil profile was chosen because it has biggest lift coefficient than others. In this study, the turbine with NACA-6712 airfoil profiled blade cross-flow turbine has been compared with ordinary one by using CFD simulation. This study use 2.7 m head and 0.04 m3/s of water discharge. ANSYS FLUENT 17 with SST turbulence model is used in this study. As a result, CFD simulation found that maximum efficiency of ordinary blades turbine is 55.3% with number of blades 25. While, the maximum efficiency of NACA-6712 turbine is 54.7% with 25 blades. From the results, it can be obtained that the ordinary turbine is better than NACA-6712 turbine.

Keywords:

Rural Area, Power Plant, Pico-Hydro, Turbine, Cross-flow, Airfoil

ME2C - 6

Study of Turbulence Modelling on Pico-hydro Turbine

D. Adanta[1*], Budiarso[1], Warjito[1], A.I. Siswantara[1]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru, Depok 16242*

This study has a purpose to find the right turbulent model to be applied in pico-hydro simulation. Method used is literature study, the first step is to characterize the flow in open channels and pipes which is turbulent using the Reynolds number. The next step is to verify whether the flow is turbulent which is done by finding out whether the flow is uniform or non-uniform. Result shows that for open channel flow and pipes having 40 l/s flow rate, the flow is turbulent. Through visual inspection it can be concluded that the flow is non uniform. From characterization of flow, it can also be concluded the flow is turbulent and thus it needs to be simulated in the form of a turbine simulation. Using the right turbulent model is necessary and this is done by comparing CFD results with experiment that has been done by several researchers. The aspect that is compared is the power. The difference between the simulation and the experiment is taken as errors. The result showed that out of the 4 turbulent models namely k-Ɛ, RSM k-Ɛ, SST k-ω and RNG k-Ɛ. RSM k-Ɛ shown the minimal errors but this model requires a lot of computational power and time because it has the transport equation that needs to be solved in which one of it is the convection equation. The model that is deemed to be an all-rounder is the SST k-ω, the difference in simulation and experiment can be categorized as the same as the error is only between 1 to 4 %. The time and power saved by using this model is due to the fact that it has only 4 equations that is specific dissipation rate, kinetic eddy viscosity, turbulence kinetic energy and closure coefficients and auxiliary relations.

Keywords:

CFD, Pico Hydro, SST k-ω, Simulation, Turbulence Modelling

Development of the Complete Model for Calculating CNC Machining Process Complexity Based on Non-Rotational Feature Classification

Hendri Ds Budiono[1,a], Mohamad Hanantri Thoyib[1,b]

[1]*Mechanical Engineering Departement, Faculty of Engineering*
Universitas Indonesia, UI Depok Campus 16424, West Java, Indonesia
[a]*hendri@eng.ui.ac.id*, [b]*m.hanantri@google.com*

Designing process of a manufacturing product takes a long time to get the detail design because it consist of many step and every decision that was taken in the designing process can affect the cost for development and manufactuing of the product from 70-80%. This push researcher to develop the previous metodes that already exist is needed to get the estimated complexity before the detail design is decided. Every manufacturing product have a value of complexity that represent the complexity of the product. Most of the manufacturing of this products uses milling machining process that is now being simplified by using Computerized Numerical Control (CNC). Milling process is charecterized into six feature that are, plain, stair, slot, notch, depression, and pocket to simplified the process of research conducted. There is tree steps in the machining process alone, starting from setup, process, and unloading. Every feature has their own complexity for every steps. Therefore a study is needed to get the complete model for calculating CNC machining process complexity based on rotational and non-rotational feature classification. In this research will be calculated the complexity by method that was introduce by El Maraghy and Urbanic from setup till unloading to any existing feature for rotational and non-rotational feature then add it up to get the complete complexity model for every feature.

Keywords:

Complexity, Setup, Process, Unloading, CNC, Turmilling Process

Study on Nugget Growth in Resistance Spot Welding of Thin Aluminum A1100 Using Welding Simulation

Ario Sunar Baskoro[1,a], Andreas Edyanto[1], Muhammad Azwar Amat[1], Hakam Muzakki[1]

[1]*Mechanical Engineering Department Faculty of Engineering Universitas Indonesia, Kampus UI Depok 16424, Indonesia*
[a]*ario@eng.ui.ac.id*

Resistance spot welding (RSW), generally which is one of the most often used to joint metal plate in the automotive and aviation industries. RSW welding process involves electrical, thermal-mechanical, metallurgy, and complex surface phenomenon. Unlike the other welding processes, weld joint formation in RSW process occurs very quick (in milli-seconds) and took place between the workpieces overlap each other. Welding simulation allows visual examination of the weld joint without having to perform an expensive experiment. Weld nugget size is the most important parameter in determining the mechanical behavior of welded joints in RSW process. There still problem in studying temperature distribution phenomenon of RSW process that influences weld quality. The simulation process will study the effect of welding parameters to the tensile-shear strength and nugget diameter. The quality and strength of the weld joint in RSW process is predominantly determined by the shape and size of the weld nugget. Simulation modeling of RSW process performed using ANSYS Parametric Design Language (APDL) module based on the finite element method (FEM), embedded in ANSYS Workbench. Electrical and transient-thermal interaction was developed to study the weld nugget growth on resistance spot welding of aluminum A1100 metal plate with a thickness of 0.4 mm respectively. Weld nugget diameter can be well predicted by using this simulation model from the temperature distribution during the welding process. Welding is performed by varying the weld current (1 kA and 2 kA) and the welding time for each electric current, which are start from 0.5, 1.0, and 1.5 cycle time. Nugget diameter for each of the welding parameters from the simulation modeling were 4,276 mm, 4,372 mm, 4,668 mm, 5,616 mm and 5,896 mm. Weld expulsion occurred for the specimen with welding current 2 kA and welding time 1.5 cycle time, characterized by the decreasing of the tensile-shear strength of the specimen.

Keywords:

Resistance Spot Welding (RSW), Aluminum A1100, Weld Nugget, Finite Element Analysis, Temperature Distribution

Effects of Micro Resistance Spot Welding Parameters to Weld Joint Quality on Aluminum Thin Plate A1100

Ario Sunar Baskoro[1,a*], Hakam Muzakki[1], Gandjar Kiswanto[1], Winarto[2]

[1]*Mechanical Engineering Department, Engineering Faculty, Universitas Indonesia, Depok Indonesia*
[2]*Metallurgical and Material Engineering Department, Engineering Faculty, Universitas Indonesia, Depok Indonesia*
[a]*ario@eng.ui.ac.id*

Resistance spot welding (RSW) was widely used in industry such as aerospace, automotive, and electrical application. However, this welding technology has some problems especially in optimization of welding parameter for joining thin aluminum. Resistance spot welding is very useful to join aluminum and welding parameter. This paper studied the influence of welding current, welding time, and electrode force of micro resistance spot welding (mRSW) to mechanical properties and fracture on the nugget of aluminum alloy A1100. Maximum load was one of mechanical properties measured by tensile test machine. The fracture on the tested specimens was analyzed by digital microscope. Aluminum plate A1100 with the thickness of 0.4 mm was used in this experiment. Alternating Current (AC) RSW machine and electrode were used in this study. Welding parameters used in this study were welding current, welding time and electrode force. Holding time was assumed constant. The value of welding time 6 Cycle time (CT), 8 CT, and 10 CT were combined with the welding current of 8 kV, and electrode force of 32 Kg, 42 Kg, and 52 Kg. Welding performances on the nugget was analyzed by maximum load to represent mechanical properties. Macrostructure analysis of this study measured the fracture area of hole on the specimens that represent nugget performance. The fracture on specimens was measured by digital microscope software. From the result it showed that by increasing electrode force, load rate decreased and elongation distance tend to decrease, except in the electrode force of 52 kg. Effect of electrode force to diameter and thickness weld nugget was not significant.

Keywords:

Electrode Force, Welding Time, Micro Resistance Spot Welding (mRSW)

ME3 - 4

Investigation of Abrasive Wear on Ball Bearings by Using Bio-lubricant

Dedison Gasnia*, Ismet Hari Mulyadi[1], Jon Affi[1], Andre Yulanda Miswar[1]

[1]*Mechanical Engineering Department, Andalas University, Kampus Limau Manis, Padang 25163, Indonesia*

Increased environmental sensitivity, renewable-based lubricants, and food grade lubricants are being considered potential alternatives to petroleum-based lubricants. Understanding of bio-lubricant in relation to abrasive wear is essential for using ball bearings in industrial implementation. This study focus on abrasive wear mechanism on ball bearings lubricated with bio-lubricants. Palm oil and coconut oils were used in this study. Coconut oils were made by two processes namely, dry and wet processing so results three types of oils (VCO, RCO, and HCO). Full-scale bearing life tests were conducted with 300 N load with 2840 rpm for 6 hours. Method of lubrication was circulating oil by using pump injection to the bearings. The ball bearing used was a self a lightning ball bearings 1206 ETN9. The results show that the main wear mechanism occurred on the surface of inner race, outer race, and ball for different bio-lubricants was abrasive wear. The discrepancies of worn surface are thought to be the physical (i.e. viscosity) and chemical (i.e. fatty acids contained) properties of bio-lubricants.

Keywords:

Bio-lubricant, Ball Bearing, Abrasive Wear, Coconut Oils, Palm Oil

ME3 - 5

Develompment of Converging-Diverging (CD) Nozzle Gene Gun to Increase Compressible Fluid Thrust Force

Haris Setiawan[1] , Gema Puspa Sari[2], Satria Putra Santoso[1], Danardono A. Sumarsono[1,a], Fera Ibrahim[2]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Depok, Indonesia*
[2]*Virology and Cancer Pathobiology Research Center (VCPRC) FKUI-RSCM,*
Department of Microbiology, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia
[a]*danardon@eng.ui.ac.id*

This paper presents simulation investigation of the velocity contour with in a transonic converging-diverging (CD) nozzle prototype to produce higher pressure and momentum output. Carl de Laval invented two-pieces nozzles, converging and diverging. The discovery of this nozzle greatly facilitates the mass delivery process. A light mass particle is a mass that easily flows with air that can be compressed through the nozzle. It also can be applied in various ways, one of them is vaccination in health. Nozzle is an important part of the gene gun which used to accelerate DNA in particle form with a gas flow to reach adequate momentum to enter the epidermis of human skin and elicit immune response.

Keywords:

Nozzle; Gene Gun; DNA; Vaccination; Immune Response

The Effects of Dielectric Fluid Viscousity on Chips Formation Rate and Electrode Wear Rate in Electrical Discharged Machining of SKD 61 Steel

Triyono[1,a], Joko Riyono[1], Nur Fadhli[1], Daisman P.B. Aji[1]

[1]*Department of Mechanical Engineering, Universitas Trisakti, Jakarta, Indonesia*
[a]*triyono@trisakti.ac.id*

Electrical Discharge Machining (EDM) is a machine for cutting workpieces with thermal energy derived from electrical spark from tool (cathode) to workpiece (anode). As EDM process requires a dielectric fluid in the cutting operation, the characteristics of the dielectric fluid play an essential role for obtaining excellent cutting. Jatropha curcas has been demonstrated for use as a dielectric fluid in EDM process. However, the drawback is that the Rate of Metal Removal (RMR) is lower than that of generally-used dielectric fluid in industry. We consider that the cause is a much higher viscosity of the jatropha curcas. This study was conducted to investigate the characteristics of a new dielectric fluid mixture of jatropha curcas and kerosene. Kerosene was used in the mixture to reduce the viscousity of the jatropha curcas since the kerosene has a much lower viscousity. The measurement of the viscousity of the fluid mixture was performed using an Ostwald viscosimeter. Evidently, when the jatropha curcas mixed with the kerosine the viscousity of the mixture is lower than that of the pure jatropha curcas. The effects of the viscousity of the fluid mixture were investigated by measuring the RMR and Tool Wear Rate (TWR). The RMR and TWR were determined by calculating the difference in the weight of the workpiece and the tool, respectively, before and after the cutting for a certain cutting interval. The measurements were carried out for eleven different concentration of the fluid mixture by varying the current of 15 and 21 Amp, with replication of 3 times. As the result, the energy released during the cutting process affects the values of TWR and RMR. It was also found that in contrast to the effect on TWR, the RMR was not influenced by the viscousity of the mixture.

Keywords:

EDM, Jatropha Curcas, Metal Removal, Tool Wear, Viscousity

Influence of Number of Mold Cavity Vents on Wire Sweep in PBGA Encapsulation: FSI-MpCCI Simulation

Dadan Ramdan[1,a], Darianto[1], ChuYee Khor[2], Mohd. Zulkifli Abdillah[2,b]

[1]*Mechanical Engineering Department Engineering Faculty, Medan Area University Medan, Indonesia*
[2]*School of Mechanical Engineering Universiti Sains Malaysia Penang, Malaysia*
[a]*dadan@uma.ac.id,* [b]*mezul@eng.usm.my*

This paper presents three-dimensional (3D) fluid structure interaction (FSI) technique; using Mesh based Parallel Code Coupling Interface (MpCCI), for the visualization of wire sweep during encapsulation of plastic ball grid array (PBGA) package. The effect of number of mold cavity vents on the melt flow behavior, wire sweep, and pressure and stress distributions, are mainly studied. The 3D model of mold and wires are created using GAMBIT, and the fluid flow and structure are simulated using FLUENT and ABAQUS, integrated with MpCCI. The Castro-Macosko model is used to incorporate the polymer rheology and Volume of Fluid (VOF) technique is applied for melt front tracking. User-defined functions (UDFs) are incorporated to allow for curing kinetics. Wire sweep profiles and pressure distribution around wires region within the mold are presented. The numerical results of melt front patterns and filled volume are compared with the previous experimental results and found in good agreement. It is observed that the number of vents significantly influence the pressure force developed inside the mold cavity and the eventual wire sweep; as the number of vents increases, wire sweep decreases.

Keywords:

Fluid Structure Interaction, Mesh Based Parallel Code Coupling Interface, Castro-Macosko Model, Epoxy Molding Compound, Volume of Fluid, Wire Sweep

The Compensation Method for Tool Orientation Change to Avoid Collision in 5-axis Roughing of Faceted Models

Gandjar Kiswanto[1], Himawan Hadi Sutrisno[1], Jos Istiyanto[1]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Depok, Indonesia*

Adding CC points during the rough machining process on a closed-bounded volume (CBV) may result in an interference between the tool and the workpiece in each initial tool orientation. Since the ultimate goal is to add the volume of the machining during the roughing process, the added CC points as well as the initial tool orientation must be positioned accordingly so that they are not affected by the collision between the tool and the workpiece. This paper discusses the method to avoid the collision for each CC point in CBV areas which is the numeric interpolation method and the method to detect collision faceted model-based method. The process of detection and avoidance may be conducted multiple times to obtain CC points with tool orientations which are free from interference. The result of the calculation is used as the basis for the creation of additional tool path in the rough machining process, especially for models with closed-bounded areas, in order to increase the effectiveness of the rough machining process.

Keywords:

CBV Area, Gouging Elimination, Roughing, Faceted Models, Tool Orientation

ME3 - 9

Punch Force Behavior during Micro V-Bending Process of the Copper Foil

Gandjar Kiswanto[1], Aida Mahmudah[1], Dedi Priadi[2]

[1]*Laboratory of Manufacturing Technology and Automation, Department of Mechanical Engineering, Universitas Indonesia, Indonesia*
[2]*Department of Metallurgy and Materials Engineering, Universitas Indonesia, Indonesia*

In sheet metal forming, bending is defined as uniformly straining process around a linear axis. Due to the tool and process simplicity, a V-bending process is normally used in sheet metal working. To investigate the behavior of the punch force, the micro V-bending process conducted to the 0.1 mm thickness of copper foil. The process was performed with the punch speed 0.5 mm/s, 1.0 mm/s, 5.0 mm/s and 10.0 mm/s. The result showed that the punch force profile contains the free-bending stage and coin-bending stage. In the free bending stage, the force magnitude was not influenced by punch speed, but with the geometry and mechanical properties of the sheet material. Meanwhile, towards the bottoming stage, the force magnitude increased impressively due to the friction between material and punch-die surfaces.

Keywords:

Micro V-bending Process, Punch Force Behavior, Punch Speed, Copper Foil

ME4 - 1
ICSERA1 - 1

Single Phase Steam Ejector Investigation: Effect Different Area Ratio Throat to Entrainment Ratio

Stefan Mardikus[1,a] and Gregorius Riyanto[1,b]

[1]*Mechanical Engineering Department, Faculty of Science and Technology, Sanata Dharma University, Indonesia*
[a]*stefan@usd.ac.id,* [b]*gregoriusbryan92@gmail.com*

The utilization of waste and low-grade thermal energy has become an interest to researchers ever since this type of energy is available from sources, such as industrial processing waste, solar collectors, and emission from automobile. Steam ejector refrigeration system is an application, which is economically feasible and environment friendly as it can operate with waste heat and a harmless refrigerant such as water. This refrigeration system has many advantages such as high reliability, structural simplicity, long life span, low cost, relatively flexible in terms of refrigerant use, easy to maintain and can be used with water which is the most environment friendly refrigerant. Ejector application in air-conditioning or refrigeration system is either to totally replace the compressor or is used for cycle optimization. The aim of this experiment is to investigate the entrainment behavior and performance of steam ejector. Through enlarging the designed mixing chamber by replaceable throats, optimum area ratio throat of mixing chamber is studied experimentally. A small scale steam ejector refrigeration system was designed and manufactured. This ejector setup consist of an open loop configuration and the boiler operates in the pressure range of Pb = 100 to 400 kPa. The typical evaporator temperatures operates from Te = 50 to 80 degree Celsius, while the condenser temperature fixed at Tc = 27 degree Celsius. The mixing chamber with 8 mm diameter and three length configurations (50 mm, 100 mm, 150 mm) are tested with 2 mm nozzle diameter. With variable area ratio throat of mixing chamber, this experiment shows that the optimum entrainment ratio is obtained by throat area ratio 18.75 at 100 kPa primary pressure and 80 degree Celsius secondary temperature at 1.00.

Keywords:

Area Ratio Throat, Entrainment Ratio, Steam Ejector

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ME4 - 2
ICSERA1 - 2

Mass Flow Characteristics Analysis of R245fa in EEV

Ting Chen[1], Kyungjin Bae[2], Dongan Cha[2], Ohkyung kwon[1,2,a*]

[1]*Advanced Energy and Technology, Korea Institute of Industrial Technology Campus, Korea University of Science and Technology, Cheonan 31056, Republic of Korea*
[2]*Korea Institue of Industrial Technology, 89 Yangdaegiro-gil Ipjang-myeonl, Cheonan-si 31056, Republic of Korea*
[a]*kwonok@kitech.re.kr*

In this paper, mass flow characteristics of R245fa through EEV are investigated. By keeping temperature at EEV outlet at constant, the experiments were conducted under varying EEV inlet temperature, subcooling temperature and EEV opening. According to the experimental results, the mass flow rate of R245fa is found to increase with increasing condensing temperature and EEV opening. And subcooling temperature has some but little impact on the mass flow rate.

Keywords:

R245fa, Flow Characteristics, EEV

ME4 - 3
ICSERA1 - 3

Numerical Investigation on Cooler Tank of FASSIP-01

I Gusti Bagus Wijaya Kusuma[1,a], I Nengah Suarnadwipa[1], Aprianto Tangkesalu[1]

[1]*Department of Mechanical Engineering, Faculty of Engineering,*
Udayana University Kampus Bukit Jimbaran, Bali, Indonesia, 80362
[a]*wijaya.kusuma88@yahoo.com*

FASSIP-01 is an experimental test equipment that dedicated to a single-phase flow with variable heater power parameters and coolant flow rate in the cooler. In FASSIP-01 system, there are several important components where one of them is a cooler tank. Cooler tank consists from refrigerator pipes and cooler tubes. The experimental cooler tank results that had been done in BATAN, especially in refrigerator pipes, indicated that the temperature was increased from the initial state. This condition must not be happened since the functions of the cooler must reducing temperature. This study aimed to analyze the heat transfer systems that occur on the cooler tank through numerical investigation. By simulation methods and mathematical calculations, numerical investigation determines how much fluid coolant temperature in the cooler tubes can be decreased in the refrigerator pipe. Numerical investigation also calculte the increasing performance of the system. Boundary coondition and initial ccoondition imposed carefully to find temperature distribution on the tube. Results of the first numerical simulation uses to imposed in the next computation stage. After all, the data about simulation with the assumption has been analyzed to perform the result of simulation with real conditions. The last numerical simulation uses as the main result of this research. From the analysis of research conducted here, it found that the temperature at the inlet-outlet refrigerator pipes is decreased from 26^{o}C into 21,57^{o}C after cooling process. To increase performance of the cooler tank, extended surface has been added along the tube. The extended surface on the main pipe cooler tubes showed an increase of work includes the heat transfer rate and the effectiveness of cooler system by 16%. By increasing the heat transfer area, it can be seen that heat transfer on cooler tank increase of about 24.9%. It can be concluded that by using numerical investigation, heat transfer and performance of cooler tank of FASSIP-01 can be studied clearly.

Keywords:

Heat Transfer, Numerical Simulation, Buoyancy, Cooler Tank, FASSIP-01

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Propagation of Chaos in Power Control Games for Energy-Efficient Wireless Networks

Hana Baili

Laboratory of Signals and Systems
CentraleSup´elec–CNRS–Universit´e Paris-Sud, Universit´e Paris-Saclay
3 rue Joliot-Curie, Plateau de Moulon, 91192 Gif-sur-Yvette, France
Email: hana.baili@centralesupelec.fr

The question of energy management is a major engineering challenge in any wireless communication system that is constrained by finite battery resources. In this article we address the problem of transmit power control in a multi-user wireless network with a single base station and random time-varying channels transmitting in parallel and interfering between each other. We suggest a stochastic particle system for studying the game of control; specifically, the channels are modelled as purely discontinuous Markov processes with known characteristics. The signal to interference plus noise ratio (SINR) determines the interactions among particles. Dimensionality reduction of the multi-objective optimization problem relies on chaos propagation, i.e., on the fact that the independence of particles persists in time as and when their number becomes large. And then we solve the optimal control problem for one representative of the particle system. Here we develop a martingale approach for an alternative open-loop optimal control instead of the feedback one since the latter is not computationally feasible.

Keywords:

Purely discontinuous Markov processes, Particle systems, Chaos propagation, Optimal control, Hamilton Jacobi Bellman equation, Fokker–Planck equationApplicator

A 10-Bit TFT-LCD Column Driver IC with an RDAC-Embedded Op-amp

Chih-Wen Lu and Yen-Chung Huang

Department of Engineering and System Science, National Tsing Hua University, Hsinchu, 300, Taiwan, R.O.C.

This study proposes a 10-bit column driver IC with RDAC-embedded op-amps for TFT-LCD applications. The 10-bit DACs are divided into positive 9-bit and negative 9-bit components to save the silicon die area. Each output channel combines a 6-bit two-voltage selector and a 3-bit RDAC-embedded op-amp in a cascaded manner. The 6-bit two-voltage selector chooses two adjacent gamma voltages from the global resistor string. The 3-bit RDAC-embedded op-amp generates a voltage level between the selected two voltages according to the lower 3 bits and then drives the LCD data line. The 10-bit column driver prototype was realized in 0.18-μm CMOS technology with the worst DNL/INL being 0.29/0.72 LSB. The silicon area is only 11 × 373 μm2 for each output channel.

Keywords:

liquid crystal display (LCD), driver circuit, liquid crystal display driver, digital to analog converter (DAC)

An Evaluation of DNS Server Health of Public Universities in Sumatera Island

Rizal Munadi[1,a], Eka Firdaus[2], and Teuku Yuliar Arif[1]

[1]*Electrical and Computer Engineering Department, Engineering Faculty, Syiah Kuala University*
Jalan Tgk. Syech Abdurrauf No.7, Darussalam Banda Aceh 23111
[2]*Electrical Engineering Post Graduate Program, Engineering Faculty, Syiah Kuala University*
Jalan Tgk. Syech Abdurrauf No.7, Darussalam Banda Aceh 23111
[a]*rizal.munadi@unsyiah.ac.id*

DNS is one of the important names in web-based information technology that allows users to be able to browse the desired information. DNS service has some similarities with a list of phone book that stores telephone numbers and addresses. To perform the function, the DNS service configured on a special machine that serves the request is a DNS Server. The reliability and accuracy of a DNS server in providing information must be maintained. However, there are times when a DNS server fails to function normally and provide good service. Therefore, in this study, the DNS servers are surveyed and evaluated where they are installed on public universities scattered throughout the provinces on the island of Sumatra, Indonesia. The accreditation standard BAN PT rank is used as a reference mapping and evaluation of the DNS Server. To evaluate the DNS Server, the test is done by DNS health approach considering factors: response time and reliability. The results show that the majority public universities DNS Server health is good and only a small portion that needs to be addressed so that the service information is not compromised. To cope with the problem of DNS Server health, it needs to evaluate the DNS server regularly, always get the DNS Server benchmarks and adopt a variety of settings from the website of the prestigious universities so that the performance of DNS servers always provide the best service.

Keywords:

DNS server, DNS health, response time, reliability, coherency

Palm Vein Recognition by Using Modified of Local Binary Pattern (LBP) for Extraction Feature

Dini Fronitasari[a], Dadang Gunawan[b]

Department of Electrical Engineering, Faculty of Engineering,
Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia
[a]dinifronitasari@yahoo.com, [b]guna@eng.ac.id

Palm vein recognition is developing biometric identification technology. It can be used in physical security and information security for selective control of access to a place or resource. A palm vein recognition has been gaining research interest from last few years because it use physiological inctrinsic that uniqueness, stability, not easily spoofed and damaged and have live body identification.There are consists of the following steps: Image acquisition from the database and Pre-Processing, Finding of Region of interest, Extraction of Palm Vein pattern Features and Matching. Prior to the palm vein recognition, vein extraction is generally required for a better recognition. In this paper we propose a vein extraction method modified of the Local Binary Pattern (LBP) combining with Probabilistic Neural Network (PNN) for matching. The aim of the proposed system is to improve the accuracy of palm vein recognition. Simulation result show that the proposed method has a higher recognition rate for palm vein recognition comparing to the other basic Local Binary Pattern.

Keywords:

Biometric, palm vein, local binary pattern (LBP), diagonal cross local binary pattern (DCLBP), probabilistic neural Network (PNN)

Predicting Daily Consumer Price Index Using Support Vector Regression Method

Intan Ari Budiastuti[1,a], Supeno Mardi Susiki Nugroho[2,b], Mochamad Hariadi[2,c]

[1]*Dept of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
[2]*Dept of Computer Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
[a]*intan15@mhs.ee.its.ac.id,* [b]*mardi@ee.its.ac.id,* [c]*mochar@ee.its.ac.id*

Inflation rate could describe economic growth and it is usually used by policy-maker to determine a monetary policy. The Consumer Price Index (CPI) is one of indicator used to measure inflation rate. Until now, the inflation calculations and CPI prediction are conducted on monthly even though it is now likely to predict them on daily basis by utilizing online commodity price movement. Daily predictions could become a tool to analyze the real value of the market and will allow policymakers to make better policy. This is a preliminary research to develop daily CPI prediction model by using Big Data. This paper discussed daily prediction model by using real-time data (daily commodity price and exchange rate) and SVR method. Build model focussed on accuracy and execution time. Grid Search and Random Search method were applied to select the best parameter for SVR model. In addition, we compared SVR method with linear regression and Kernel Ridge Regression method. The results show that the prediction model using SVRkernel RBF has MSE value, 0.3454, less than other methods. Execute time for process data show that Kernel Ridge method has training time 0.0698s, little faster than SVR method 0.134s.

Keywords:

Consumer Price Index, Support Vector Regression, Linear Regression, Kernel Ridge Regression, Big Data

Implementation of Timestamping Linking Protocol in a Web Based Timestamping Application

Abdul Aziz Al Rasyid, Dion Ogi, Steven Yohanes

Department of Crypto Engineering
National Crypto Institute
Bogor, Indonesia

Digital files can be easily manipulated by using software that taken freely in internet. This issue makes piracies feasible against another person's copyrights on documents that could harm or inflict financial loss upon the documents owners. On the other hands, it's hard to determine which documents are firstly made upon another. Timestamping protocol is one of the solution for this problem. Nevertheless, the uses of this protocol have an obvious problem which is possible for the trusted third party (TTP) to collude with one of the party to cheat the others. This study implements Timestamping Linking Protocol (TLP) in a web-based application to avoid that. This study uses Web Modelling Language Method to build the application and then uses Web Application Testing to evaluate it. The result of this study is a web based application that implements TLP. It provides authentication, information about creation time of the documents. It also identifies whether TTP collude with another party to manipulate the documents.

Keywords:

Authentication, Cryptography Protocol, Timestamping linking protocol, Web Modelling Language

Analysis on Green IT Applications Usage for the Firm's Competitive Advantage Strategy

I Putu Deny Arthawan Sugih P.[a], Eko Nugroho[b], Rudy Hartanto[c]

Department of Electrical Engineering and Information Technology.
Universitas Gadjah Mada.
Yogyakarta, Indonesia.
[a]putudeny.cio15@mail.ugm.ac.id, [b]nugroho@ugm.ac.id, [c]rudy@ugm.ac.id

Green IT is a concept about wisely, efficiently, and environmentally technology (IT) usage or adoption that exists due to the negative impacts of technology (IT) growth. There are some examples about Green IT applications that are used by the organization (firm) such as Paperless Office (PLO), E-Meeting, Remote System, and Cloud Computing. Although Green IT applications are used as the support tools of organizational business processes but their strategic benefits are still unknown, so the research on this paper aims to analyze Green IT applications usage for the firm's competitive advantage strategy. This paper takes the case at PT. XYZ, an Indonesian telecommunication firm. The questionnaire was used as the research instrument on this paper for collecting the research data at the firm's IT Division and the data was analyzed by SmartPLS. The research result on this paper shows Green IT applications usage positively affects the firm's competitive advantage and Green IT applications usage is positively affected by perceived usefulness, subjective norm, and organizational culture. The result is also supported by the related themes of the firm's annual reports for the recent years and the various respondents' related positive opinions. Only perceived risk is not proven negatively affecting Green IT applications usage at the firm. This paper may be used as a reference for the firm stakeholders to view Green IT applications usage as the firm's important asset for developing the firm's competitive advantage strategy.

Keywords:

Green IT, Competitive Advantage Strategy, Organizational Business Processes

Performance Comparison Between Four Data Models Used in Data Warehousing

G C Rorimpandey[1], J P Zwarts[2]

[1]*Universitas Negeri Manado, Jl.Kampus Tondano, Minahasa 95618, Indonesia*
[2]*HAN University of Applied Sciences, Ruitenberglaan 26, Arnhem 6826 CC, The Nethelands*

Data Warehouses have increasingly become important in organizations that have large amount of data. It is not a product but a part of a solution for the decision support system in those organizations. Data model is the starting point for designing and developing of data warehouses architectures. Gathering data requirements, optimizing databases performance, and providing source and target system documentations are critically important in data warehouse development and are the reasons why data models should be designed properly.The performance of the data model in data warehouses became one of the essential criteria of the data warehouse that have to be future-proof because it maintains information which are always changing. Thus, the data model needs stable interfaces and consistent for a longer period of time. How to know which data model has the best performance is a very important question that should be known by data warehouse experts in companies which employs Business Intelligence. In this report, there are four data models that will be used a performance comparison experiment, which are: Anchor Model, Optimal Normal Form (ONF), Star Schema and Data Vault. The four models are populated with the same facts, and each are queried differently to answer 13 information needs. The information needs are designed in a query for each model as the measurement for those models because each model has different table structures. The result of this research is discussed in a statistic analysis method. The post-hoc analysis and the ANOVA were done with GraphPad Prism 6. All the duration of single execution of one query runs were entered as data, and the program calculated the average for the measurements itself. As a check, SPSS yielded exactly the same ANOVA results when only these averages were entered as data. The result of this experiment represents that there is no statistical difference between Anchor Model, Star Schema, ONF and Data Vault. Furthermore, by the null hypothesis, the ONF and Anchor Model do not differ significantly. But, by the post-hoc analysis shows the star schema performs worse than the other three models.

Keywords:

data warehouse, data model, performance comparison, SQL Query Processing, ANOVA Analysis

Smart Vending Machine Based on SMS Gateway For General Transactions

Moch. S. Arifin S[1,a] , Mat Syai'in[1,b] , J.Endrasmono[1], Sryang T. Sarena[2,c], L. Subiyanto[2], A.S.Setyoko[2], Boedi Herijono[3], R.T.Soelistijono[3], Aang Wahidin[3] Adi Soeprijanto[4]

[1]*Automation Engineering Study Program, Shipbuilding Institute of Polytechnic Surabaya (SHIPS)/ Politeknik Perkapalan Negeri Surabaya (PPNS), Indonesia*
[2]*Marine Electrical Engineering Study Program, Shipbuilding Institute of Polytechnic Surabaya (SHIPS)/ Politeknik Perkapalan Negeri Surabaya (PPNS), Indonesia*
[3]*Shipbuilding Engineering Study Program,Shipbuilding Institute of Polytechnic Surabaya (SHIPS)/ Politeknik Perkapalan Negeri Surabaya (PPNS), Indonesia*
[4]*Departement of Electrical Engineering, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia*
[a]*syamsul.to1a@gmail.com,* [b]*matt.syaiin@gmail.com,* [c]*sryang.e@gmail.com*

This paper presents design and experimental studies of vending machine for office stationery Transactions. The advantage of the proposed vending machine i.e. Transaction can be done by using short message system (SMS), all transaction can be monitored online by owner by using Android, the vending machine has fiture early warning system (EWS) when systém in trouble, and it also equiped with battery back up when electricity cut off, No need to make special agreement with bank or telecomunication provider. The Smart Vending Machine is built by using common hardware component such as Arduino as controller, Wavecome as SMS Gateway module, Servos, Power Supply, Battery as power back up, Keypad and button as input, LCD 16x2 as Display. From the several test including normal transaction, online monitoring, and early warning system for electricity supply. The Smart Vending Machine was succesfull. And it has a big possibility to be mass production.

Keywords:

Smart Vending Machine, TCASH, Digital payment service, Telkomsel, TCASH Balance.and alequiped

Comparison of Gibbs Sampling and Mean Variational Inference for Latent Dirichlet Allocation on Indonesian Documents

Putu Manik Prihatini[1,2,a], Ida Ayu Dwi Giriantari[3,b], I Ketut Gede Darma Putra[4,c], Made Sudarma[5,d]

1Student of Doctoral Programed of Engineering Science, Faculty of Engineering, Udayana University, Bali, Indonesia
2Electrical Engineering, Politeknik Negeri Bali, Indonesia
3Department of Electrical Engineering, Faculty of Engineering, Udayana University, Indonesia
4Department of Information Technology, Faculty of Engineering, Udayana University, Indonesia
[a]manikprihatini@pnb.ac.id, [b]dayu.giriantari @unud.ac.id, [c]ikgdarmaputra@unud.ac.id, [d]msudarma@unud.ac.id

Latent Dirichlet Allocation has been developed as topic-based method which uses reasoning to determine the topics of a document. There are many methods of reasoning used for Latent Dirichlet Allocation, including the Gibbs Sampling and Mean Variational Inference, the most widely used in research. However, there have not been many studies that discuss the implementation of these two methods on the Indonesian documents, so analysis is needed to compare its performance in generating feature extraction. Therefore, in this paper, will be implemented the method of reasoning Gibbs Sampling and Mean Variational Inference for Latent Dirichlet Allocation on Indonesian documents. The objective is determining the performance of both algorithms on Indonesian documents so it can provide a reference about the better reasoning method for Latent Dirichlet Allocation on Indonesian documents. The research was implemented on digital Indonesia news text data with 100 documents. The tests are conducted on feature data as the result of extraction process using metric Precision, Recall and F-Measure, to determine the performance of the two algorithms. The test results show that Gibbs Sampling has a better performance than Mean Variational Inference for Latent Dirichlet Allocation on Indonesian documents.

Keywords:

feature extraction, latent dirichlet allocation, gibbs sampling, mean variational inference, Indonesian documents

E2 - 7

Majority Vote Technique Based On Multi Rough Set for Multi Attributes Decision-Making System:

Case Study Classifying Job Competency for Civil Servants' Functional Works in Ministry of Religious Affairs of Republic of Indonesia

Asri Yulianti[1,2,a], Surya Sumpeno[1,b], Mauridhi Hery Purnomo[1,c]

[1]*Multimedia Computing Laboratory, Department of Computer Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
[2]*Ministry of Religious Affairs Jember, Indonesia*
[a]*asri.yulianti15@mhs.ee.its.ac.id,* [b]*surya@ee.its.ac.id,* [c]*hery@ee.its.ac.id*

In the government agencies, civil servants are required to have competence or ability to finish the work effectively and efficiently. In fact, the decision-making system for determining position and assignment of civil servants' functional works is still performed manually, so it takes a longer time. Moreover, the results are not totally accurate in terms of their competency. Rough set, hereinafter called Single Rough Set, is a common method to solve this problem, but the process may be very complex and still has the unclassified result. In this research, Multi Rough Set and Majority Vote technique are proposed to enhance system performance of single rough set with multi attributes of job competency. It obtains accuracy rate with 5-fold cross-validation that is 83.67% better than a Single Rough Set and it has 0.947 Area Under Curve (AUC) derived from Receiver Operator Characteristic (ROC). Thus, it can be said that the system performance of Multi Rough Set can be considered excellent in classifying job competency for civil servants' functional works.

Keywords:

job competency, multi attributes, multi rough set, majority vote, decision-making system

Improved Structure of Ground Terminals for Crosstalk Reduction in SAS-3 Storage Connector Design

Ding-Bing Lin[1,a], Chung-Ke Yu[2,b], Chih-Kang Lai[2,c], Ko-Ying Huang[2,d]

[1]*Department of Electronic and Computer Engineering, National Taiwan University of Science and Technology, Taipei, Taiwan,*

[2]*Department of Electronic Engineering, National Taipei University of Technology, Taipei, Taiwan*

[a]*dblin@mail.ntust.edu.tw,* [b]*jonk.yu56@gmail.com,* [c]*dact8842412@gmail.com,* [d]*mo060928@gmail.com*

In this paper, we proposed a board to board connector design for high-speed storage devices. The proposed design utilizes a terminal structure with ground clipper and ground blade to reduce the near-end crosstalk (NEXT) and far-end crosstalk (FEXT) such that the connector performance satisfies SAS-3 connector specification. Three improved designs of connector model are studied and compared with the legacy SAS-2 connector design. Also, the capacitive and inductive parameter of the transmission lines of proposed designs have been extracted in order to determine the contribution of crosstalk noise caused by capacitive and inductive coupling. Furthermore, the Sparameter results have been validated by full-wave simulation tool HFSS in the frequency domain analysis. For the NEXT and FEXT all proposed design shows significant improvement with 10~40dB than the legacy design and the strength under -40dB from DC to 6GHz. In addition, the proposed connector design can meet the crosstalk requirement of SAS-3 connector specification.

Keywords:

board to board connector, SAS-3 connector, SAS-2 connector, high-speed storage devices, NEXT, FEXT

E2 - 9

A High Accuracy FPGA Vernier Time-to-Digital Converter Based on PLL Delay Matrix

Poki Chen, Member, IEEE, Yi-Su Chung, Wei Yang Tai

A previous FPGA two-dimensional Vernier stochastic time-to-digital converter (TDC) was proposed to achieve 2.5 ps bin size and -2.98~ 3.23 LSB integral nonlinearity (INL). However, the delay lines cannot be compensated for PVT variations and thus the TDC performance is strongly dependent on the stochastic distribution of the cell delays. Moreover, the input range is limited to be less than 20ns. In this paper, a high accuracy FPGA Vernier TDC is realized with PLL delay matrix instead to provide a rather PVT-insensitive solution with both high resolution and wide measurement range. The cell delays are mainly under the control of major and minor PLLs to make all clock phases as evenly distributed over the reference period as possible to achieve an extremely fine resolution. Experimental results achieve a PVT-insensitive TDC resolution of 15.6 ps. The long-term DNL and INL are measured as -0.14 ~0.12 LSB and - 0.14~ 0.11 LSB over a measurement range as wide as 1μs. A new milestone in the performance of FPGA TDC is thus established.

Keywords:

2D Vernier, field-programmable gate array (FPGA), Phase-Locked Loop(PLL), PLL Delay Matrix, stochastic, time-to-digital converter (TDC), PVT-insensitive

Real-time Monitoring of Charge-pumping Process for SiO2/Si Interface Analysis

Masahiro Hori[1,a], Tokinobu Watanebe[1,2], Yukinori Ono[1,b]

[1]*Research Institute of Electronics, Shizuoka University, 3-5-1 Johoku, Hamamatsu, 432-8011, Japan*
[2]*Graduate School of Science and Engineering, University of Toyama, 3190 Gofuku, Toyama, 930-8555, Japan*
E-mail : [a]*hori.masahiro@shizuoka.ac.jp,* [b]*ono.yukinori@shizuoka.ac.jp*

Time-domain charge pumping, which monitors transient currents during the charge pumping process, is a novel technique for analyzing interface defects of semiconductors. In this paper, we make a brief introduction about our recent works on the development of the time domain charge pumping, aiming at the detailed analysis of metal-oxide-semiconductor interface defects. We in particular show that the time-domain charge pumping enables us to obtain capture cross sections of electrons and holes independently, and to resolve electron-emission spectra into two components with different time constants. It is also shown that it allows us to investigate complicated current flow during the charge pumping process in silicon-on-insulator devices.

Keywords:

Charge pumping, Interface state, Time domain, SiO2/Si interface, Silicon on insulator

Effect of Ge Mole Fraction on Current, Voltage and Electric Field Characteristics of High Doping Nanoscale $Si_{1-x}Ge_x$/Si P-N Diode

Anak Agung Ngurah Made Narottama[a], Anak Agung Ngurah Gde Sapteka[b]

Electrical Engineering
Politeknik Negeri Bali
Denpasar, Indonesia
[a]*narottama@pnb.ac.id*, [b]*sapteka@pnb.ac.id*

In this paper, we report the simulation of high doping nanoscale heterojunction diode, particularly $Si_{1-x}Ge_x$/Si p-n diode, using Cogenda Visual TCAD. In order to gain knowledge on electrical properties of this diode, we exhaustively simulate the effect of Ge mole fraction in SiGe material on current, voltage and electric field characteristics. The simulation covers Ge mole fraction of 0.2 to 0.7 in SiGe material as acceptor and Si material as donor. Both acceptor and donor have concentrations of 10^{20} per cm^3 and areas of 10×10 nm^2. Under forward bias voltage, higher Ge mole fraction will produce higher current. This phenomenon happens due to lower energy band gap at higher Ge mole fraction condition. Besides that, higher Ge mole fraction has lower energy difference between P side and N side of diode. According to the simulation result, $Si_{0.8}Ge_{0.2}$ has energy band gap about 0.8 eV, meanwhile $Si_{0.3}Ge_{0.7}$ has energy band gap about 0.5 eV. Lower energy band gap causes more electrons have enough energy to cross the junction. Meanwhile under reverse bias voltage, high doping nanoscale diode will produce infinitesimal current. At the junction, high doping nanoscale $Si_{1-x}Ge_x$ /Si P-N diode also has lower electric field (measured at the center of diode) at higher Ge mole fraction. Under reverse bias voltage of -2 V, $Si_{0.3}Ge_{0.7}$ has maximum electric field about 5.89×10^6 V/m, meanwhile $Si_{0.8}Ge_{0.2}$ has maximum electric field about 6.17×10^6 V/m. We predict that Ge mole fraction has inversely proportional effect to the maximum electric field value. Therefore, we concluded that Ge mole fraction affects current, voltage and electric field characteristics of high doping nanoscale $Si_{1-x}Ge_x$ /Si P-N diode.

Keywords:

SiGe, Si, Ge, mole fraction, current, voltage, electric field, p-n diode, high doping, nanoscale, Cogenda Visual TCAD

E3A - 3

Measurement of particles in oil using shear horizontal surface acoustic wave sensor

Saya Kobayashi[1], Jun Kondoh[2,a]

[1]*Graduate School of Integrated Science and Technology, Shizuoka University, Hamamatsu-shi, Japan*
[2]*Graduate School of Science and Technology, Shizuoka University, Hamamatsu-shi, Japan*
[a]*kondoh.jun@shizuoka.ac.jp*

A shear horizontal surface acoustic wave (SHSAW) device is used as a sensor for the liquid environment. As a main particle displacement of the SH-SAW is parallel in the propagation surface and perpendicular in the propagation direction, the SH-SAW does not radiate its energy into the liquid. Therefore, SH-SAW is suitable for the liquid measurement. In this paper, particles in oil are measured by using the SH-SAW. The experimental results show that the velocity and attenuation changes increase with increasing the amount of the iron particles. Whereas the velocity change obtained is qualitatively explained by the perturbation theory for the mass loading, the attenuation change cannot be explained. Therefore, it is necessary to develop the new theory for particle loading in oil environment.

Keywords:

shear horizontal surface acoustic wave, liquidphase sensor, oil environment, particle measurement

E3A - 4

Effect of Anode and Cathode Workfunction on the Operating Voltage and Luminance of a Single Emissive Layer Organic Light Emitting Diode

Arief Udhiarto[a], Layina Maula Haryanto, Bobi Khoerun, Djoko Hartanto

Electrical Engineering Department, Faculty of Engineering
Universitas Indonesia
Depok, Indonesia
[a]*arief@ee.ui.ac.id*

Organic light emitting diodes (OLED) are considered to be a promising candidate for light sources as well as for flat panel display because of their numerous advantageous. Two important parameters of an OLED among many other parameters to measure OLED performance are operating voltage and luminance. Those two parameters are believed to be strongly influenced by an anode and cathode workfunction of materials used as electrodes. In this paper, we study the effect of anode and cathode workfunction on the operating voltage and luminance of a single emissive layer organic light emitting diode. Devices with five different cathode: Aluminum (Al), Calcium (Ca), Magnesium (Mg), Argentum (Ar), and Cuprum (Cu) and three different anode: Indium Thin Oxide (ITO), Poly- (3,4-Ethylenedioxidythiophene)-Poly (Styrene Sulfonate) (PEDOT:PSS), Zinc Oxide (ZnO) are compared and analyzed. A 2 nm thick of Polyfluorene (PFO) is used as an emissive layer. SimOLED is used to simulate and analyze both electrical and optical characteristics. Current voltage luminance (IVL) characteristics are simulated under forward biased from 0 to 10 V. We found that the use of anode with higher workfunction can reduce operating voltage as well as increases device luminance. On the other hand, the use of lower workfunction of cathode can reduce operating voltage however it is not always increasing device luminance. The decrease of the operating voltage by increasing anode workfunction and decreasing cathode workfunction are ascribed to the barrier lowering of the holes and the electrons respectively.

Keywords:

OLED, organic light emitting diode, operating voltage, luminance, workfunction, anode, cathode

E3A - 5

Surface Functionalization of Fluorocarbon Polymers by Atmospheric Pressure Plasma Jet with Ion Bombardment Effect

Masaaki Nagatsu[1,2], Masahiro Kimpara[2] and Tomy Abuzairi[3]

[1]*Research Institute of Electronics, Shizuoka University, Hamamatsu, 432-8561 Japan*
[2]*Graduate School of Integrated Science and Technology, Shizuoka University, Hamamatsu, 432-8561 Japan*
[3]*Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

Fluorocarbon polymers are the stable and toughest polymers because of the presence of strong C-F and C-C bonds. These bonds are often hard to break, which creates difficulty in surface modifications. Surface modifications by low pressure plasma surface treatment have proven to be efficient and have been reported earlier. However, the widely reported low pressure plasma experiments needed high vacuum systems and are often costly. Contrary to that, atmospheric pressure plasma jet (APPJ) methods have advantage as they can be used under atmospheric conditions. In this study for the functional group modification of fluorocarbon polymers, it was subjected to plasma surface treatment by APPJ under biased condition. Biasing substrate creates an ion bombarding effect, which will make dangling bonds of polymer surface and eventually improve the modification on the surface.

APPJ device was created by winding a copper tape to the glass tube having an inner diameter of 3 mm. A glass tube was attached to the tip of the device. The copper tape was connected to H.V power. The plasma was generated by applying a high voltage of ±8 kV with a frequency of 5 kHz and duty ratio of 50% to the electrodes. Fluorocarbon polymers were modified by two types of functional groups by changing gas species supplied to APPJ. Helium and ammonia gas was used in the amino group modification, which provides the nitrogen containing species. Helium and oxygen gas was used in the carboxyl group modification, which provides oxygen containing species.

A fluorescent microscope image of fluorocarbon polymers surface after functional group modification are clearly shown, where fluorescence patterns were similar to the mask pattern, showing clear modification in the maskless area. Hence the modification of fluorocarbon polymers surface by APPJ was experimentally confirmed in the present study. The detail of the experimental results will be presented at the conference.

Keywords:

atmospheric pressure plasma jet, fluorocarbon polymers, surface modification, ion bombardment, functional group, amino group, carboxyl group

E3A - 6

Bifacial Heterojunction Intrinsic Thin Layer Solar Cells as a BioFET Supply

Cahyaning Nur Karimah[a], Retno Wigajatri P., Tomy Abuzairi, Nji Raden Poespawati

Electrical Engineering Department
Universitas Indonesia
Depok, Indonesia
[a]*cahyaning.nur@ui.ac.id*

Solar cells design as an independent supply for biosensor Field Effect Transistor (bioFET) is required to over come electricity supply. Integrating bioFET with solar cells generates some benefits that include efficiency, low costs, and environmental friendly. In the design of solar cells, the bifacial structure of Hetero-junction Intrinsic Thin layer (HIT) was selected, and the optimization on the structure was carried out with the help of AFORS-HET software. The optimization of such a structure was undertaken by placed the intrinsic thin layers on both sides of the substrates or Transparent Conductive Oxides (TCO) that were placed on the front and back sides of the cell. In order to minimize the recombination, a Back Surface Field (BSF) was also put in the rear cell of the structure. Research on bifacial HIT structure needs to be done to select a solar cells structure that is most suitable with the voltage required by the bioFET. There are five structures modeling had done to have suitable structure using AFORS-HET. The entire five structures had been simulated on equilibrium mode, and they generally have shown to possess a band alignment type II, namely staggered heterojunction. The simulation results in equilibrium mode obtained one structure which the smallest ΔE_C and ΔE_V among the other four structures, that is TCO / a-Si:H(p) / a-Si:H(i) / c-Si(n) / aSi:H(i) / a-Si:H(n+) / TCO / Al with ΔE_C and ΔE_V, 0.15006798 eV and 0.445920 eV respectively. This 2nd structure also has a smallest barrier in ϕ_{Bn}= 0.6791392 eV and ϕ_{Bp}= 0.08314 eV, respectively. The built-in potential of the 2nd structure is 1.13 V. This structure have I_{SC}=0.083 A/cm^2 and V_{OC} = 0.313 V. The deviation between built-in potential and V_{OC} is realize in 0.817. The maximum current and maximum voltage are I_m = 0,076 A/cm^2 and V_m = 0,25 V respectively, so the maximum power of this structure is 0.019 Watt/cm^2 . Therefore the 2nd structure is the most appropriate structure to fulfill the bioFET supply.

Keywords:

BioFET, solar cells, bifacial HIT, band alignment

E3A - 7

A Statistical Study on the Formation of A-Few-Dopant Quantum Dots in Highly-Doped Si Nanowire Transistors

Adnan Afiff, Tarik Hasan[1,2], Michiharu Tabe[1], Daniel Moraru[1], Arief Udhiarto[2], Harry Sudibyo[2], Djoko Hartanto[2], Arup Samanta[3], Manoharan Muruganathan[4], Hiroshi Mizuta[4]

[1]*Research Institute of Electronics, Shizuoka University, Hamamatsu, Japan*
[2]*Faculty of Engineering, Universitas Indonesia, Depok, Indonesia*
[3]*Indian Institute of Technology, Roorke, India*
[4]*Japan Advanced Institute of Science and Technology, Nomi, Japan*

Single-electron tunneling (SET) transistors have been studied for the past several decades because they are promising for low-power consumption and fundamental-level control of charge. The quantum dots (QDs) that are the main part of an SET transistor have been demonstrated in a variety of materials, but recently dopant-atoms in silicon have also been shown to work as QDs. However, a single conventional dopantatom has usually a shallow ground state energy level below the conduction band edge (~45 meV). This means that the tunnel barrier is relatively low and thermally-activated current can flow over the barrier. Therefore, the operation of dopant-atom SET transistors remains limited to low temperatures. In this work, we statistically analyze the key factors for raising the SET operation temperature up to room temperature (>300 K).

Keywords:

dopant-induced quantum dot, single-electron transistor, silicon nanodevices, room temperature, high doping concentration

E3B - 1

Wideband BPF Composed of Planar Inverted-F Shaped for S-Band Frequency Application

Achmad Munir[a], Habibur Muhaimin, Mohammad Sigit Arifianto, Chairunnisa,

Mohammad Ridwan Effendi, Andriyan Bayu Suksmono

School of Electrical Engineering and Informatics, Institut Teknologi Bandung
Bandung, Indonesia
[a]munir@ieee.org

This paper deals with the design and implementation of wideband bandpass filter (BPF) composed of planar inverted-F shaped. The filter is intended to have working bandwidth more than 1GHz at S-band frequency for radar application. The choice of inverted-F shape is due to the ability to provide flexibility characteristics in impedance matching and working bandwidth. Prior hardware realization and measurement, the performance of filter is numerically investigated to obtain the optimum design. The prototype is then realized by constructing 2 identical elements of planar inverted-F shaped which every single element is etched on a 1.6mm thick flame retardant (FR) glass-reinforced epoxy dielectric substrate with the dimension of 24mm in length and 33mm in width. From the measurement, the realized filter shows a good agreement in frequency responses comparable to the simulated result with minimum insertion loss of 1.17dB within the passband area and 10dB less of return loss in the frequency range from 1.92GHz to 3.21GHz.

Keywords:

Bandpass filter (BPF), inverted-F shaped, planar, S-band frequency, wideband

Effect of Truncation Shape Against Axial Ratio of Left-Handed Circularly Polarized X-Band Antenna

Farohaji Kurniawan[1,2,a], Josaphat Tetuko Sri Sumantyo[1,b], Mujtahid[2,c], Achmad Munir[3,d]

[1]*Josaphat Microwave Remote Sensing Laboratory, Center for Environmental Remote Sensing, Graduate School Advanced Integration Science, Chiba University, Chiba, Japan*

[2]*Center for Aeronautics Technology, National Institute of Aeronautics and Space, Bogor, Indonesia*

[3]*Radio Telecommunication and Microwave Laboratory, School of Electrical Engineering and Informatics, Institut Teknologi Bandung, Bandung, Indonesia*

[a]*farohaji.kurniawan@lapan.go.id,* [b]*jtetukoss@faculty.chiba-u.jp,* [c]*mujtahid@lapan.go.id,* [d]*munir@ieee.org*

In this paper, an effect of truncation shape of lefthanded circularly polarized (LHCP) X-band antenna against its axial ratio is investigated. The antenna which is designed to have the center frequency of 8.2GHz and the axial ratio bandwidth of 400MHz is intended to be implemented for satellite communication. It is deployed on an NPC-H220A dielectric substrate with the dielectric constant of 2.17 and the thickness of 1.6mm. The structure of antenna is constructed of two layer dielectric substrates in which the top side of first layer is for radiation element, then the top side of bottom layer is for feeding line and the bottom side of bottom layer is for groundplane. The truncation is set in the edge of radiation element at 45^o from z-axis and 45^o from x-axis. The investigation is performed by varying the shape of truncation on radiation element. Three different shapes of truncation, i.e. triangle-shaped, square-shaped, and ellipse-shaped, are applied for investigating the antenna parameter focused on its axial ratio. From the result, it shows that the antenna with ellipse-shaped truncation has the widest axial ratio bandwidth among other shapes ranges from the frequency of 7.89GHz to 8.4GHz.

Keywords:

Axial ratio, left-handed circularly-polarized (LHCP), shape truncation, X-band antenna

E3B - 3

Incorporation of High Permittivity Circular Dielectric Resonator for Enhancing Resonant Frequency of Microstrip Antenna

Antrisha Daneraichi Setiawan[1,a], Achmad Munir[2,b]

[1]*Department of Electrical Engineering, Faculty of Engineering, Universitas Jenderal Achmad Yani, Cimahi, Indonesia*
[2]*Radio Telecommunication and Microwave Laboratory, School of Electrical Engineering and Informatics, ITB, Bandung, Indonesia*
[a]*antrisha.setiawan@gmail.com*, [b]*munir@ieee.org*

This paper deals with the incorporation of a high permittivity circular dielectric resonator (CDR) into a microstrip antenna which is investigated through simulation and measurement. Due to the circular shape of CDR, the microstrip antenna applied for investigation takes a circular patch with planar microstrip lines as a feeding line. The used CDR has the relative permittivity of 50 with the radius of 6.75mm and the height of 6.7mm. While, the microstrip antenna is deployed on a flame retardant (FR) glass-reinforced epoxy dielectric substrate with the relative permittivity of 4.2 and the thickness of 1.6mm. The CDR is incorporated into the microstrip antenna by placing it concentrically on the circular patch of microstrip antenna. From the experimental measurement, it shows that the resonant frequency of microstrip antenna with high permittivity CDR is lower about 1GHz than of the microstrip antenna without CDR from the frequency of 5.94GHz to the frequency of 5.04GHz. Although there is some slight different in other antenna parameters, however, both microstrip antennas show similar tendency each other in their performances.

Keywords:

Circular dielectric resonator (CDR), circular patch, high permittivity, microstrip antenna, resonant frequency

E3B - 4

Miniaturization of Array Microstrip Antenna Using Peripheral Slits for Wireless Fidelity Communication

Syah Alam[1,a], I Gusti Nyoman Yogi Wibisana[1] , Indra Surjati[2]

[1]*Electrical EngineeringDepartment , Faculty of Enginering, 17th August 1945 University*
[2] *Graduate Programe of Electrical Engineering, Trisakti University*
[a]*syah.alam@uta45jakarta.ac.id*

This paper proposed a new design of array microstrip antenna using slit technique to reduce dimension of the antenna for Wireless Fidelity Communication and to increase gain. Dimension of the enclosure of the proposed antenna is 269 mm x 87 mm. The proposed antenna using single layer FR4 substrate with relative permitivity (εr) of 4.3, substrate thicknes (h) of 1.6 mm and loss tangent (tan δ) of 0.0265. The simulation results shown that the antenna is capable working at frequency 2448 MHz with VSWR of 1.104 and return loss of -26.14 dB. Bandwidth of the proposed microstrip antenna is 320 MHz (2253 MHz – 2573 MHz). Furthermore, its dimension can be reduced up to 37.5% with its gain of the proposed antenna of 6.45 dB.

Keywords:

Wireless Fidelity, microstrip antenna, array antenna, peripheral slits.

The Design of ISM-Band Radar Antenna for Small Boat's Trajectory Tracking

Karlisa Priandana[a], Benyamin Kusumoputro[b], Eko Tjipto Rahardjo[c]

Department of Electrical Engineering
Universitas Indonesia
Depok, Indonesia
[a]karlisa.priandana@ui.ac.id, [b]kusumo@ee.ui.ac.id, [c]eko@eng.ui.ac.id

This paper discusses about the design of a specific radar antenna at ISM frequency band. The overall radar system will be utilized as a trajectory generator for a developed autonomous chaser boat prototype in which the radar antenna was designed to meet this requirement. Fresnel Zone free-space calculation revealed that the radar antenna should be placed at the lake side with a minimum height of 2.5 m. By considering the possible size and distance of the tracked boat, the required radar antenna vertical beamwidth for sufficient elevation coverage is at least 26^o. Further design process in relation to desired azimuth tracking resolution revealed that the required horizontal beamwidth is less than 15^o. A 4×8 microstrip array antenna was designed by simulations to meet these requirements. The simulation results revealed that the 3dB horizontal beamwidth was 12.2^o and the 3dB vertical beamwidth was 160^o. Two 4x8 microstrip array antennas were fabricated by utilizing the simulated design, one as transmitting antenna and the other as receiving antenna. Then, the overall performances were justified by experimental antenna measurements. The simulation and measurement results showed that the designed radar antenna can operate at ISM band with sufficient 3dB horizontal beamwidth of less than 15^o.

Keywords:

Boat, ISM, microstrip array antenna, patch antenna, radar, trajectory tracking

Substrate Integrated Waveguide Bandpass Filter for VSAT Downlink

Dian Widi Astuti[a], Arif Jubaidilah[b] and Mudrik Alaydrus[c]

Department of Electrical Engineering, Universitas Mercu Buana, Indonesia
[a]dian.widiastuti@mercubuana.ac.id, [b]arifjubaidilah@yahoo.com, [c]mudrikalaydrus@mercubuana.ac.id

Very Small Aperture Terminal (VSAT) is a transceiver station that is used to exchange information via satellite. VSAT uses frequencies that consist of uplink and downlink frequency, where the uplink frequency is greater than the downlink frequency. Uplink frequency is in a range of 5.925-6.425 GHz while the downlink frequency is at 3.7 − 4.2 GHz. In this research, a substrate integrated waveguide bandpass filter is designed on VSAT downlink frequency. The simulation shows good performances between 3.7 − 4.2 GHz of 11% fractional bandwidth. In the middle frequency, the return loss (S_{11}) is 17.76 dB and the insertion loss is 1.02 dB (S_{21}). While on the measurement result gives 3.871 dB for insertion loss (S_{21}) value and 30.87 dB for return loss (S_{11}) value.

Keywords:

Substrate integrated waveguide, defected ground structure, very small aperture terminal, microstrip filter

E3B - 7

Multiband Double Layered Microstrip Antenna by Proximity Coupling for Wireless Applications

Dian Widi Astuti[a], Ahmad Firdausi[b], and Mudrik Alaydrus[c]

Department of Electrical Engineering, Universitas Mercu Buana, Indonesia
[a]dian.widiastuti@mercubuana.ac.id,[b]ahmad.firdausi@ymail.com, [c]mudrikalaydrus@mercubuana.ac.id

The demand on higher data rate in modern communication systems leads to the use of multiband applications. A multiband double layered microstrip antenna is designed for this purpose. The patches are shaped through variation of the widths and lengths of tri-slots to achieve reflection minima at 3.1 GHz, 5.8 GHz, 7.4 GHz and 9.8 GHz, which cover many applications such as WiMax , Wi-Fi or other wireless applications. The patches are fed by proximity couplings for bandwidth enhancement. The simulation results of the reflection factor are compared by measurements. The measurements verified the theoretical approach.

Keywords:

double layered, multiband, patch, proximity coupling, slot, wideband

E3B - 8

Design of Wideband Microstrip Antenna With Parasitic Element For 4G/LTE Aplication

Yulianto La Elo[a], Fitri Yuli Zulkifli[b], Eko Tjipto Rahardjo[c]

Antenna Propagation and Microwave Research Group
Electrical Engineering Department, Universitas Indonesia
Depok, Indonesia
[a]*yulianto_laelo@yahoo.co.id,* [b]*yuli@eng.ui.ac.id,* [c]*eko@eng.ui.ac.id*

This paper discuses the design of wideband microstrip antenna which is for mobile communication especially for 4G/LTE aplication. The 4G/LTE aplications use frequency bands 850 MHz, 900 MHz, 1800 MHz, and 2300 MHz. Therefore, an alternative to support all these bands in one antenna is to design a wideband antenna. To achieve the antenna specification that has the characteristics of wideband, one of the methods that can be used is to add parasitic elements in a rectangular microstrip patch antenna. The antenna design uses FR4 substrate with a dielectric constant of 4.6 and substrate thickness 1.6mm. Ground plane, feed line, patch and parasitic elements using copper material with a thickness of 0.035mm. By using this technique, frequency band is obtained at 793.66 MHz up to 2501.34 MHz and have a bandwidth of 1707.64MHz. Approaching omnidirectional radiation pattern is obtained at the frequency of 850-900 MHz and significant changes in the 1800-2300 MHz frequency. Gain increases with increasing operating frequency. The highest gain in the range of 1800-2000 MHz is 4.47 dB. With the characteristics of this antenna, the result of the antenna design can be used for 4G/LTE application.

Keywords:

Microstrip, Wideband, Parasitic element, 4G/LTE

450nm Laser Diode Beam Shaping in Engraving Process

Lin Prasetyani[1,2,a], Purnomo S. Priambodo[1,b]

[1]*Dept. of Electrical Engineering, Universitas Indonesia*
[2]*Dept. of Mechatronic, Polman Astra Indonesia*
[a]*Lin.prasetyani@polman.astra.ac.id,* [b]*p.s.priambodo@ieee.org*

Laser applications in manufacturing processes such as cutting, welding, and engraving processes are become more popular nowadays. High-power and pulsed lasers such as CO2 and Nd:YAG gas lasers are commonly used in applications of metal cutting and welding. Meanwhile, for engraving process laser diode is more preferred due to its properties of compact shape, easy to operate, low power and high efficiency in comparison to CO2 and Nd:YAG laser gas. Owing to the rectangle resonator, the diode laser beam has some inevitable property disadvantages, such as wide angle divergence, astigmatism and beam profile which has non-ideal elliptical beam shape. These deficiencies lead to a poor quality of beam profile. In order to obtain a high quality engraving process, two things have to be considered. The first one is a significant requirement of a good beam quality, which is ideally a round beam shape and the second is characterization of burning time and laser intensity for each specific material object. The beam profile quality can be improved by several optical process steps, which finally end up to a perfect Gaussian round beam shape profile. The beam quality improvement can be done by using several-lens structures, for instances: (1) a combination of two sequential cylindrical lenses; (2) the use of two serial anamorphic prisms; (3) cylindrical micro lenses structure and (4) the usage of a single mode optical fiber. In this paper, we design a combination of two sequential cylindrical lenses to reshape a non-ideal beam shape (ellipse) generated from 450-nm laser diode to be more ideal round beam shape, which reduces the divergence angle of the fast axis. Based on the technical experience and consideration the uses of two cylindrical lenses are the most common, low cost and simple method. We analyze the quality of the beam profile by observing the laser-diode burned footprint on the material object. The round beam shape is the best shape and appropriate for engraving process. Moreover, in order to obtain a perfect engraving result, we are also conducting and reporting the burning time and laser intensity characterization.

Keywords:

Engraving, diode laser, beam profile, beam shape, elliptical, Gaussian, cylindrical lenses

Direct Current Load Effects on Series Battery Internal Resistance

M. Iwan Wahyuddin[a], Purnomo Sidi Priambodo[b], Harry Sudibyo[c]

Electrical Engineering Department
Universitas Indonesia
Depok, Indonesia
[a]*iwan_wyd@yahoo.com,* [b]*p.s.priambodo@ieee.org,* [c]*harisudi@ee.ui.ac.id*

Battery energy capacity in an application system is determined by the amount of electrical energy spent to the load and time consumption. The system reliability depends on the supply of electrical energy from the battery as the power source. The energy capacity of the battery will ensure the services provided by the unit device or equipment. As an example, the UPS system provides clean, conditioned, and continues power supply for sensitive loads such as airlines computers, data centers, communication systems, and medical support systems in hospitals, etc. Therefore, it is important to estimate accurately the remaining capacity of the battery at any time. Generally, the UPS system provides a regulated sinusoidal output voltage with switching operation and will give power to the main applications.

Some UPS inverters work by utilizing power from the battery modules. The switching operation that operated by the device will generate high frequency ripple. Many other battery applications that can be analogized as a fixed load, this meaning the load does not change until the energy capacity of the battery is reduced. Both static and dynamic loads will affect the battery's internal resistance. Some literature describes the important factor the performance of the battery modules system and the rate of degradation associated with battery internal resistance.

This paper explores how the DC load current affect the the decreasing capacity that impact increasing battery internal resistance. We do some experiments on discharging battery with switching load current at 10 second measuring time. We investigate and analyze the difference effect of the battery capacity on the internal resistance battery. We conclude that on several cycles of the battery loading will decrease the capacity will increase the internal resistance value of the battery.

Keywords:

internal resistance, direct current load, battery modules, battery life

E4A - 3

Thermal Conductance and Heat Capacity Measurement Utilizing Suspended-Wire Resistor

Hiroshi Inokawa[1,a], Hiroaki Satoh[1], Kou Akiba[2]

[1]*Research Institute of Electronics, Shizuoka University, Hamamatsu, Japan*
[2]*Graduate School of Integrated Science and Technology, Shizuoka University, Hamamatsu, Japan*
[a]*inokawa.hiroshi@shizuoka.ac.jp*

A method of measuring the thermal conductance and the heat capacity of a nanowire is presented. The nanowire is suspended in vacuum to ensure the thermal isolation, and the resistance is measured with respect to the square of the current to obtain the thermal conductance in the length direction. The heat capacity is evaluated by the frequency response of the 3f component of the voltage across the nanowire when it is driven by the AC current at f. This method is successfully applied to characterize a silicon nanowire by using a platinum wire resistor.

Keywords:

Thermal conductance, heat capacity, suspended wire, microbolometer, thermoelectric generator

E4A - 4

Preliminary Study of Plasma-treated Water for Germination Stimulation of Agricultural Seeds

Tomy Abuzairi[a], Nji Raden Poespawati, Retno Wigajatri Purnamaningsih, and Dicky Apriady

Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia
[a]tomy@ee.ui.ac.id

Plasma treatment could generate UV radiation, chemical reactions, and radicals that be able to modify the properties of a wide range of materials, including water. Water treated by plasma produces reactive nitrate-nitrogen and oxygen species that useful for the fertilization of agriculture soil and plant growth. Moreover, the water treated by plasma can be used for increasing postharvest quality of agriculture products. In this study, plasma treatment of water has been used to stimulate the germination of agricultural seed, i.e. water spinach (Ipomoea aquatica). The results demonstrate that the water spinach seeds treated by plasma-treated water not only had better germination rate and germination index, but also had a higher length index and weight. Compared with control sample, the germination rate and germination index of the plasma-treatment sample improved by 16.96% and 28.57%, respectively. Characteristics of length index also increase to 425.46. In addition, fresh weight of plasmatreatment sample was higher than the control sample by 33.3%. These results indicated that plasma-treated water might be potentially applicable for increasing water spinach plant growth.

Keywords:

Plasma, water, germination stimulation, water spinach seed, agricultural.

E4A - 5

Electrical Properties of Dye-sensitized Solar Module with Integrated Parallel Connections

Natalita Maulani Nursam[1,a], Jojo Hidayat[1], Lia Muliani Pranoto[1], Suwastika Wijayanti[2]

[1]*Research Center for Electronics and Telecommunications, Indonesian Institute of Science, Bandung, Indonesia 40135*
[2]*Department of Physics, Faculty of Science and Mathematics, Diponegoro University, Semarang, Indonesia 50275*
[a]*natalita.maulani.nursam@lipi.go.id,*

Despite the rapid development of dye-sensitized solar cell since its early breakthrough by Graetzel in 1991, further development on the design and fabrication technique still constitutes a major challenge for this type of solar cell to reach the mass production and marketing level. Generally, the upscaling of dye-sensitized solar cell for daily utilizations necessitates the interconnection of multiple cells to form modules. In this regard, the use of screen-printing method could provide a major benefit to fabricate such structure as it is feasible for industrial and large scale manufacturing process. This contribution describes the fabrication of a 100 × 100 mm^2 dyesensitized solar module using semi-automatic screen-printing technique. The fabricated modules comprised of 7 individual cells made from titanium dioxide (TiO_2) nanocrystalline films, each with an active area size of 10 × 70 mm^2, giving an active area ratio of 70%. The cells were connected to the neighboring cells in a parallel configuration. To simulate the potential of the fabricated modules for indoor applications, the current-voltage characteristics of the module were measured under an ambient lighting with an intensity of 30 mW/cm^2. The parallel interconnected dye-sensitized solar module produced an open circuit voltage (V_{OC}) of 0.71 V with a short circuit current (I_{SC}) of 21.73 mA and maximum power output (P_{max}) of 4.19 mW. Overall, the fabricated module achieved a power conversion efficiency of 1.99%. A secondary measurement under simulated sun with an intensity of 50 mW/cm^2 (0.5 Sun) was also carried out to compare the performance of the modules under different environment. Under the later condition, the V_{OC}, I_{SC}, P_{max}, and efficiency obtained were 0.77 V, 27.64 mA, 5.47 mW, and 0.15%, respectively. Our results indicated that the dye-sensitized solar module with integrated parallel connection has a prominent advantage to be applied as an energy source for applications that requires high current input under low-light condition.

Keywords:

current-voltage, dye-sensitized, efficiency, photovoltaic, solar cell, solar module, titanium dioxide

E4A - 6

Numerical Analysis of CZTS solar cell with In_2S_3 buffer layer

A study of a CZTS based thin film solar cell, concerning the effects of several parameters on its electrical performance

Sakib Mohammad[1,a], Md. Noumil Tousif[1,b], A. A. Ferdous[1,c], Prof. Dr. Md. Ashraful Hoque[1,d], Mohammad Wahidur Rahman[2,e]

[1]Department of Electrical and Electronic Engineering, [2]Electrical and Computer Engineering Department
[1]Islamic University of Technology, Board Bazar, Gazipur 1704, Bangladesh, [2]Ohio State University, Columbus OH 43210, United Stated of America
[a]sakibmohammad1994@gmail.com , [b]noumiltousif@gmail.com , [c]aferdous@iut-dhaka.edu , [d]mahoque@iut-dhaka.edu , [e]wahidur@iut-dhaka.edu

The performance of Cu_2ZnSnS_4(CZTS) solar cell was investigated using a simulator called Solar Cell Capacitance Simulator(SCAPS). An n doped Zinc Oxide(n-ZnO)/Indium Sulfide(In_2S_3)/CZTS structure was used in the simulation. These materials are cheap and non-toxic which is an important factor keeping the idea of mass production in mind. The performance was recorded for different thicknesses of CZTS absorber layer, different thicknesses of the buffer layer and different values of acceptor density of CZTS. The thickness of the CZTS absorption layer was varied between 0.25-5.0µm, absorption layer carrier density was changed between 0-2*10^{14} cm^{-3} and the buffer layer was 50nm thick. CZTS layer was thicker than In_2S_3 in order to increase the photon absorption which will eventually produce electricity. These parameters were optimized and the best energy conversion efficiency obtained was obtained 19.23% (with V_{oc}=0.835v, J_{sc}=27.675mA/cm^2, fill factor=83.22%). The study also includes the effect of high temperature of the proposed structure. Simulations show the favorable result which can help to prove the feasibility of highly efficient CZTS thin film solar cell.

Keywords:

CZTS, SCAPS, Thin film, Solar cell, In2S3 buffer layer

E4A - 7

Crystalline Silicon Solar Cell Design with $Al_xGa_{1-x}As$ As Heterojunction with Compound Thin Layer for Biosensor Application

Syam Erast Prayoga, Retno Wigajatri, Tomy Abuzairi, Nji Raden Poespawati[a]

Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia
[a]pupu@eng.ui.ac.id

Solar cells have been through many development phases. Silicon is a one of many important materials in solar cell manufacturing. Heterojunction with Intrinsic Thin-layer crystalline silicon solar cell is one of silicon solar cell applications, which can produce high efficiency. An alternative to Heterojunction with Intrinsic Thin-layer crystalline silicon solar cell is Heterojunction with Compound Thin-layer crystalline silicon solar cell where silicon is coupled with III-V semiconductor compound. n-AlGaAs is used as an alternative from n-AlAs on Heterojunction with Compound Thin-layer crystalline silicon solar cell. Compared to AlAs, lattice constant of AlGaAs is more suitable to the silicon. In order to increase its solar cell efficiency the step grading method is used for $Al_xGa_{1-x}As$ layer on the front surface. The optimization of step grading $Al_xGa_{1-x}As$ layer was done by using the wxAMPS software as simulation tool. Simulation results show that HCT crystalline silicon solar cell produce short circuit current (J_{sc}) is 16.64 mA/cm^2, open circuit voltage (V_{oc}) is 1.05 V, fill factor is 0.95, and efficiency is 16.64 %. The power it produces can be used as power source for HGM-111 biosensors.

Keywords:

HCT Solar Cell, AlGaAs, Step grading, Biosensor application, wxAMPS

E4B - 1

Handheld Pulse Oximeter Based on Single Board Computer Raspberry Pi B +

Ernia Susana[a], Hendrana Tjahjadi[b]

[1,a]*Department of Electromedic Engineering, Politeknik Kesehatan Kemenkes Jakarta II, Jakarta, Indonesia*
[2,b]*Department of Electrical Engineering, Universitas Indonesia, Depok, Indonesia*
[a]*erniayg@gmail.com,* [b]*hendrana.tjahjadi61@ui.ac.id*

Self-monitoring enables patients to become more active participants in their health care, home pulse oximetry can provide objective data for determining health status and the possible need for medical consultation or interventions. Pulse oximetry is a non-invasive and continuous method for monitoring the blood oxygen saturation level. Pulse oximetry has gained acceptance in the medical community caused low costs and easy to operation. Prototype pulse oximeter in previous research still use system based on microcontroller. Microcontroller system is ideal for building robotic systems but microcontroller system has a weakness in terms of processing the signal. During the last decade, development of single board computer has provided smaller, faster and more affordable. The aim of this study to develop a prototype handheld oxygen saturation based on singleboard computer Raspberry Pi for home care. The added value of this research is using the single board computer system and the graphical user interfaces were designed to become more informative. This study uses experimental research with a quantitative approach. The results of this study successfully developed a prototype pulse oximeter equipped by LCD touch screen that can display the value of oxygen saturation (SpO2), pulse rate (PR) and photoplethysmography (PPG). The reliability of oxygen saturation and heart rate were quite stable from ±1% to ±2% compare gold standard, with standard deviation range of 0.577 to 1.

Keywords:

pulse oxymetry, raspberry pi, SpO2, qt, pulse rate, photoplethysmography

The Model of Near Infrared Sensor Output Voltage as a Function of Glucose Concentration in Solution

Engelin Shintadewi Julian[a], Kiki Prawiroredjo[b], Gunawan Tjahjadi[c]

Electrical Engineering Department
Trisakti University
Jakarta, Indonesia
[a]*eshintadewij@trisakti.ac.id,* [b]*kikipra@trisakti.ac.id,* [c]*gunawandea@gmail.com*

The number of people with diabetes increases every year in the whole world, including Indonesia. Diabetes is a major cause of stroke, heart attack, kidney failure, lower limb amputation and one of the leading causes of death. In order to manage their blood glucose level, diabetics have to test their blood glucose level as often as possible according to certain medical guidance, diet, exercise and consume medicine regularly. Unfortunately, the current blood glucose testing is inconvenient and uncomfortable, even cause pain for diabetic or patient; therefore a noninvasive blood glucose measurement is highly desirable. Although several research works have already been done in this area, a successful noninvasive method is still in search. In order to contribute in this research area, we study the effect of glucose concentration in solutions with different concentration to the output voltage of a near infrared sensor as a preliminary research to obtain a successful noninvasive blood glucose meter. In this paper we reported the model of near infrared sensor output voltage as a function of glucose concentration. The main components of the near infrared sensor are a 1450 nm light emitting diode (LED) as light source, and a photodiode that is sensitive to that wavelength as the sensing device. The distance between LED and photodiode is 15mm. The solutions have 50 mg/dl, 100 mg/dl, 200 mg/dl, 300 mg/dl, and 400 mg/dl glucose concentrations. An acrylic cylinder with 40 mm diameter was filled with 5 ml glucose solution for each concentration. The results show that higher glucose concentrations produce lower sensor output voltages. The linear trend line shows good fit with those data. The value of correlation coefficient is -0.99 which indicate strong relationship between the sensor output voltages and glucose concentrations.

Keywords:

glucose solution, near infrared sensor, mathematical model, noninvasive measurement

Design of Ultrawideband Applicator for Microwave Ablation Aimed at Thermal Therapy in Liver Cancer

Faisal Narpati[1,a] and Basari[1,2,b]

[1]*Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, West Java, 16424 Indonesia*
[2]*Research Center for Biomedical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, West Java, 16424 Indonesia*
[a]*fnarpati@gmail.com*, [b]*basyarie@eng.ui.ac.id*

Thermal ablation is conducted by utilizing temperature changes to destroy the abnormal tissue or restore its function. The latest technique in thermal ablation is Microwave Ablation (MW Ablation) that rely on the propagation of electromagnetic waves that is able to increase the temperature of a tissue rapidly. Changes in temperature during the ablation process will reduce the water content in the body tissue (78% of the liver tissue is composed of water) and affect the value of permittivity and conductivity of the tissue. These changes cause the impedance matching of the antenna applicator also change during the ablation process. The change on impedance will make the system does not match with the previous resonant frequency. In addition, the microwave ablation applicator, which is designed for specific frequencies (2.4 GHz and 915MHz) with narrow band characteristics will be suffered from aforementioned phenomenon. Meanwhile, according to the previous studies there are other prominent resonant frequencies that used for MW Ablation, i.e. 1.9 GHz, 6 GHz, 9.2 GHz and 10 GHz. Therefore to accommodate some of the frequencies that are widely used in microwave ablation technique and to tackle the problems arising from the reduced transmission efficiency, then an applicator that has ultrawideband (UWB) characteristics is proposed. In this paper, we design an applicator, which has the characteristics of UWB by modifying the ground plane of the applicator by a hexagonal-sectioned coil. The applicator is designed on a FR4 substrate and numerically simulated with liver phantom by using CST Microwave Studio. The proposed applicator is able to have wide bandwidth by 8.1 GHz, with lower frequency (f_l) 1.84 GHz and higher frequency (f_h) 10 GHz.

Keywords:

Applicator, Liver Cancer, Microwave Ablation, Thermal Therapy, Ultrawideband

Relative Wavelet Bispectrum Feature for Alcoholic EEG Signal Classification Using Artificial Neural Network

Prima Dewi Purnamasari[a], Anak Agung Putri Ratna[b], Benyamin Kusumoputro[c]

Department of Electrical Engineering
Faculty of Engineering Universitas Indonesia
Depok, Indonesia

This paper proposes a novel relative wavelet bispectrum (RWB) approach for EEG signal feature extraction method to differentiate the signal between the alcoholic over the non-alcoholic subjects. Firstly, the EEG signal is calculated for its autocorrelation frequencies as the basic step in the bispectrum calculation. Then, the discrete wavelet transform (DWT) is applied substituting the FFT which usually is used in the bispectrum calculation. Lastly, the relative value of each frequency band is calculated for both the approximation and the details parts, producing the RWB. The proposed methodology is implemented in an alcoholic automated detection system using 1200 data samples from UCI EEG Database for alcoholism. Based on the experiments, the setting value of lag in the autocorrelation calculation was evidently very influential on the recognition rate obtained, i.e. the maximum value for the lag was the best. Using cross validation, the highest results from RWB feature extraction method with ANN classifier achieved about 90% recognition rate.

Keywords:

Electroencephalogram, alcohol, bispectrum, wavelet, automatic recognition, artificial neural networks

Portable Gamma Ray Tomography System for Investigation of Geothermal Power Plant Pipe Scaling

Bayu Azmi[1,2], Wibisono[2], Adhi Harmoko Saputro[1,a]

[1]*Department of Physics, Universitas Indonesia, Depok, 16424, Indonesia*
[2]*Center for Isotopes and Radiation Application, Badan Tenaga Nuklir Nasional (BATAN), Jakarta, 12440, Indonesia*
[a]*adhi@sci.ui.ac.id*

A portable gamma ray tomography system has been designed to investigate geothermal power plant pipe scaling. Furthermore, the system could be applied to diagnose industrial processes unit such as pipeline, heat exchanger, and so on. The system consists of mechanical parts, computerized controlled module, a gamma ray source (80 mCi of Cs-137), a scintillation detector NaI(Tl), data acquisition and computer. The mechanical part was designed to meet the portability standard of industrial processes unit such as dimension, position, material type, etc. The investigated object is scanned an in two ways (translation and rotation) of ray transmission to capture attenuated radiation automatically. The result of object investigation is displayed in computer directly using a proposed reconstruction image technique. The reconstruction image was performed using Filtered Back Projection (FBP) algorithm and optimized with the weighted correction factor for each pixel. The weighted correction factor was computed based on the modeling of gamma ray transmission in selected mechanical system. In evaluating the proposed system, experiments were performed using a geothermal power plant pipe that has 275 mm diameter within known scaling form. Steady state water was flowed inside the pipe to simulate multiphase condition in geothermal power plant pipeline. Scanning configuration was set up to 4 mm steps and 32 projections. Based on the chosen evaluation criteria, the reconstruction image of the proposed system shows good result. Finally, the proposed portable gamma ray tomography system is suitable to industrial applications due to its portability and accuracy in detecting the form of pipeline scaling.

Keywords:

gamma ray, pipe scaling, portable system, tomography

E4B - 6

Headgear Recognition by Decomposing Human Images in the Thermal Infrared Spectrum

Brahmastro Kresnaraman[1,a], Yasutomo Kawanishi[1,b], Daisuke Deguchi[2,e], Tomokazu Takahashi[3,f], Yoshito Mekada[4,g], Ichiro Ide[1,c] and Hiroshi Murase[1,d]

[1]Graduate School of Informatics, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8601, Japan
[2]Information Strategy Office, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8601, Japan
[3]Faculty of Economics and Information, Gifu Shotoku Gakuen University, 1-38 Naka-uzura, Gifu 500-8288, Japan
[4]Graduate School of Computer and Cognitive Science, Chukyo University, Tokodachi, Kaizu-cho, Toyota 470-0393, Japan
[a]brahmastrok@murase.is.i.nagoya-u.ac.jp, {[b]kawanishi, [c]ide, [d]murase}@i.nagoya-u.ac.jp, [e]ddeguchi@nagoya-u.jp, [f]ttakahashi@gifu.shotoku.ac.jp, [g]y-mekada@sist.chukyo-u.ac.jp

Surveillance systems play a critical role in security and surveillance. A surveillance system with cameras that work in the visible spectrum is sufficient for most cases. However, problems may arise during the night, or in areas with less than ideal illumination conditions. Cameras with thermal infrared technology can be a better option in these situations since they do not rely on illumination to observe the environment. Furthermore, in our daily lives, it is common for humans to wear headgears such as glasses, masks, and hats. In surveillance, such headgears can be a hindrance to the identification of a person, and hence pose a certain degree of risk. This is not ideal in areas where the identity of a person is important, for example, in a bank. Therefore, in this paper we propose a headgear recognition method using an innovative decomposition approach on thermal infrared images. The decomposition method is based on Robust Principal Component Analysis, a modification of the popular Principal Component Analysis. The proposed method performs decomposition on a human image and isolates headgears in the image for recognition purposes. Experiments were conducted to evaluate the capability of the proposed method. The results show a positive outcome when compared with other methods.

Keywords:

Headgear recognition,thermal-infrared, human images, decomposition

E4B - 7

Identification of Pulse Frequency Spectrum of Chronic Kidney Disease Patients Measured at TCM Points Using FFT Processing

Erni Yudaningtyas[1,a], Djoko H. Santjojo[2], Waru Djuriatno[3], Indrazno Siradjuddin[4], Muhammad Rony Hidayatullah[5]

[1,3,5]*Faculty of Engineering, Department of Electrical Engineering, University of Brawijaya*
[2]*Faculty of Science, Department of Physics, University of Brawijaya*
[4]*Department of Electrical Engineering, Malang State Polytechnic*
Jl. M.T. Haryono 167, Malang 65145, Indonesia
Email: [a]erni@ub.ac.id

Mortality due to chronic kidney disease (CKD) increases significantly in a recent year. The disease often is diagnosed in an advanced stage. On the other hand, there has been traditional Chinese method or technique to diagnose the presence of the CKD. The diagnosis is carried out by examining pulse palpation at three points namely cun, guan and chi located at the radial artery of the left hand. Records of the pulse pattern of the CKD patients showed irregular characteristics compared with regular pattern obtained from healthy subjects. The aim of this study was to determine the relationship between the frequency spectrum of the irregular pulses related to the stages of the CKD especially from the chi area. Data of the irregular pulse were categorized into 6 stages i.e. 1, 2, 3a, 3b, 4, and 5 of the CKD patients. The data were collected by measuring pressure during systolic periods or when blood vessels were in a relaxed state. In this period, the instrumentation records reflections of the pulse including information about the amplitudes, frequencies, and pulse wave patterns. Observations were focused on the part of the signal between low and high amplitude on pulse patterns (systolic period). The irregular patterns were processed by a Fast Fourier Transform (FFT) technique to find out their special characteristics quantitatively. Results showed that the pattern irregularity was related to the severity of the kidney dysfunction. The FFT processing results showed a number of different special characters in the spectrum. The data were clustered related to the CKD stages. The clustered data of the CKD patients indicates a correlation between the stages and the shifting of the spectrum to lower frequencies which are 0.26 Hz compared to health subject's data 1.11 Hz.

Keywords:

Chronic Kidney Disease, Fast Fourier Transform, Pulse, Radial Artery, Traditional Chinese Medicine

E4B - 8

Review of Photoplethysmography Based Noninvasive Continuous Blood Pressure Methods

Hendrana Tjahjadi[a], Kalamullah Ramli[b]

Departement of Electrical Engineering
Universitas Indonesia
Depok, Indonesia
[a]hendrana.tjahjadi61@ui.ac.id, [b]kalamullah.ramli@ui.ac.id

Blood pressure is an important parameter for early detections of cardiovascular diseases. There have been many relevant technological advances to measure blood pressure, such as in wearable sensing, pervasive computing, and smartphones. The disadvantage of conventional measurement is discomfort for the patients because of painful cuff inflation. The emergence of photoplethysmography for blood pressure estimation is offering a more convenient method. Photoplethysmography can generally be grouped into the following three categories; pulse wave velocity, pulse transit time, and pulse wave analysis. The objective of this review is to study the achievement of photoplethysmography based non-invasive continuous blood pressure methods. The method is quite promising and useful for the future studies and enhancement on cuff-less continuous BP monitoring approach.

Keywords:

continuous blood pressure, non-invasive blood pressure, photoplethysmography, pulse wave analysis) insert (key words)

E4C - 1

Design and Implementation of Adaptive PID Controller for Speed Control of DC

Suwandi Dwi Sahputro, Fahmi Fadilah, Nanda Avianto Wicaksono, Feri Yusivar[a]

Electrical Engineering
Universitas Indonesia
Kampus UI Depok 16424, West Java, Indonesia
[a]*yusivar@yahoo.com*

This paper describes the design and implementation of adaptive PID control strategy for controlling the angular velocity of the DC motor. Adaptive PID controller is designed to calculate the control parameters which are tuned adaptively to give desired control performance even if parameters of DC Motor are changed. The controller's parameters are online tuned when the motor is running using a Recursive Least Squares (RLS) method. The controller is able to change the value of the controller's constants to maintain motor performance as it is desired when parameters of DC motor are changed. Initially a Pseudo Random Binary Sequence (PRBS) signal is given to the system for 0.07 seconds to get the estimated transfer function of the plant system (DC motor) using the RLS algorithm. From coefficients of the estimated system's transfer function, the poles of a desired characteristic equation can be obtained for the system that has the appropriate output. Thus, the proportional, integral and derivative constants of controller can be obtained by using online pole placement method. Here, an online identification system is used to determine the new control parameters. The effectiveness of this adaptive PID controller is verified by experimental results using a microcontroller STM32F446.

Keywords:

DC motor, PID controller, adaptive controller, recursive least square, STM32F446

Study of Speed Sensorless Permanent Magnet Synchronous Motor (PMSM) Control Problem Due to Braking during Steady State Condition

Bernadeta Wuri Harini, Aries Subiantoro, Feri Yusivar[a]

Electrical Engineering
Universitas Indonesia
Kampus UI Depok 16424, West Java, Indonesia
[a]*yusivar@yahoo.com*

This paper presents sensorless control of Permanent Magnet Synchronous Motor (PMSM). In the sensorless control method, the stator current is measured to estimate the speed of the motor. When PMSM sensorless control is used in an electric vehicle, sometimes it causes another problem. When the motor is running in steady state and the motor is suddenly given a large load that has reverse torque direction, it will make a problem. In this case, the large load that is applied is a brake. The motor goes in a wrong orientation. This fact is an undesirable condition. The condition must be controlled so the motor can work well. This issue causes the sensorless control has not really applied to commercial interests. The phenomenon of wrong orientation will be the interest of our research. To predict the speed of the motor, we use Model Reference Adaptive System (MRAS) method as an observer. The IP speed controller is used to control the system. This phenomenon is verified by experimentation in the laboratory.

Keywords:

PMSM, sensorless control, load, brake, MRAS

E4C - 3

PID Structure Based Active Queue Management: A Study

Misbahul Fajri[1,2,a], Kalamullah Ramli[1,b]

[1]*Electrical Engineering Department, Faculty of Engineering, Universitas Indonesia*
[2]*Faculty of Computer Science, Universitas Mercu Buana, Jakarta, Indonesia*
[a]*Misbahul.fajri61@ui.ac.id,* [a]*fajri@mercubuana.ac.id,* [b]*k.ramli@eng.ui.ac.id*

Since Feedback TCP flow dynamic model was introduced by Hollot active queue management methods can be analyzed through control theory. This paper reviews PID structure based active queue management methods. AQM algorithms research literature are presented. The main motivation of this work is to study and summarize PID structure based AQM approaches, their characteristic and interaction between their compositions.

Keywords:

Active Queue Management, Control Theory, Proportional Integral Derivative, Network Congestion Control

E4C - 4

Estimating the UAV Moments of Inertia Directly from Its Flight Data

Jemie Muliadi[a], Rizki Langit[b] and Benyamin Kusumoputro[c]

Electrical Engineering Dept.
Universitas Indonesia
Depok, Indonesia
[a]jemie.muliadi51@ui.ac.id, [b]rizki.langit@ui.ac.id, [c]kusumo@ee.ui.ac.id

This article proposes a practical new method to obtain the moment of inertia of UAV, named ARES. The ARES method simultaneously determined all the elements of UAV's Tensor of Inertia, i.e. the moments and the products of inertia through algebraic solving. The ARES method directly uses the UAV Flight Data to accommodate accuracy issues of modeling such as vehicle's geometrical imperfection; manufacturing defect, any non-symmetrical due component placement, etc. This proposed method was applicable for various purposes of UAV modeling e.g. flight control design, flight dynamics analysis, etc.

Conventionally, UAV moments of inertia were estimated by tabulating, CAD-based, or pendulum method. Since these existing methods were constrained by the accuracy and practical issues, we develop the ARES method which using the UAV's flight data to resolve both issues. After undergone appropriate mathematical strategies, the ARES produce a linear construction for algebraic solving technique. The implementation the proposed method in the quadrotor flight data showing that ARES are successfully measured the asymmetrical terms which important for nonlinear controlling, that previously neglected by the conventional methods. Thus, the ARES estimates the UAV Tensor of Inertia in holistic, sophisticated and practical fashion.

Keywords:

moment of inertia, inertia tensor, modeling methodologies, model development and analysis, UAV, quadrotor modeling

E4C - 5

Stabilising A Cart Inverted Pendulum System Using Pole Placement Control Method

Indrazno Siradjuddin[1,a], Zakiyah Amalia[1], Budhy Setiawan[1], Rendi Pambudi Wicaksono[1], Erni Yudaningtyas[2]

[1]*Malang State Polytechnic*
[2]*University of Brawijaya*
Electrical Engineering Department
Malang, Indonesia
[a]*indrazno@polinema.ac.id*

A cart inverted pendulum system is one of the most common case to be considered for testing many control algorithms, since it has some challenging problems associated with non linearity, complexity and underactuated system model. In fact, non-linearity behaviour of the inverted pendulum can be observed easily. Different pendulum angle response can be obtained by giving the same velocity in the cart. The cart inverted pendulum can be understood as an under actuated system since the system has a lower number of actuator than the degrees of freedom. One of the most convenient method to model the inverted pendulum system is to use Lagrange's equation. However, at present, many presented inverted pendulum models have been derived using simplified physical model. This simplified model may lead to problems for the implementation of the control algorithm in a real physical inverted pendulum system. In this paper, an inverted pendulum system model is presented, where a mechanical transmission system and a motor models have been included in the derivation of the inverted pendulum model. Hence, the problems for the control implementation in a real system can be minimized. The mathematical model of the inverted pendulum was derived using Lagrange's equation. The determination of the pole zero of the system is discussed. A simple method of pole placement is proposed to stabilise the pendulum at the desired position of the cart. Matlab simulation results show the effectiveness of the proposed method. And yet, this intuitive approach can lead to better understanding of the control behaviours.

Keywords:

Cart Inverted Pendulum, Non Linear System, Pole Placement, Lagranges Equation, Underactuated System

E4C - 6

Modelling, Simulation and Control of a High Precision Loading-Unloading Robot for CNC Milling Machine

Muhammad Ramadiansyah[1,a], Wahidin Wahab[1,b], Nasril[2,c]

[1]*Department of Electrical Engineering, University of Indonesia, Depok, Indonesia*
[2]*MEPPO- BPPT, Badan Pengkajian dan Penerapan Teknologi, Banten, Indonesia*
[a]*ramadiansyah@hotmail.com,* [b]*nasril65@gmail.com*

The high precision Loading unloading robot under studied is one of the CNC Machines developed to support the Intra-ocular Eye-Lens manufacturing process. the Robot uses two DC Servo Motor as the actuators for the position control in cartecian coordinate. The desired specification of the Robot is of a very high accuracy which is reaching 10μm in high speed, such that it is necessary to understand the dynamic characteristic of the servo motors in the robot. Based on the physical modeling of the robot a set of high order transfer function is developed, and by conducting simulation using matlab, the effect of the increase in gain on the servo motor towards the respond of the system can be studied. The experiment on DC Servo Motor control using Aerotech Ensemble software will be conducted to find the incremental effect of each gain in the controller, and compared to the simulation result from Matlab. A good understanding of the controller behavior can be achieved in this paper, and the specific effect of each servo gain to obtained the desired specification can be learned, such that the manual setting of the gain on Robot controller can be done optimally.

Keywords:

CNC Milling Machine, Cartecian Robot, Aerotech Ensemble, DC Servo Motor

Design and Prototyping of 3-Phase BLDC Motor

Y.B. Adyapaka Apatya, Aries Subiantoro and Feri Yusivar[a]

Electrical Engineering Department, Universitas Indonesia, Depok 16424, Indonesia
[a]*yusivar@yahoo.com*

The development of electric vehicle is now growing rapidly. Demands to deliver a reliable and easy to drive in motor control causes Brushless Direct Current (BLDC) motor becomes a potential candidate. A BLDC motor drive is a potential option for an electric vehicle since it has a high reliability, simple design, and ability to work at high rotation per minute (RPM). This paper discussed the Permanent Magnet BLDC Motor design method. The structure of an interior rotor permanent magnet type is selected to be used in the design of Permanent Magnet BLDC motor so that it can be applied in a drive that requires a large torque and capable of acceleration and deceleration with good response. Selection of 12 slots and 8 poles configuration aims for improving the motor performance. The motor is designed and simulated using a software-based Motor Solve FEA (Finite Element Analysis). Based on this design and simulation results, a prototype of BLDC motor is built. Parameters testing as stator resistance, inductances (the d-axis and q-axis inductance), and the back emf constant (Ke) were used to evaluate the result of the design and prototype motor. Measuring the prototype motor's parameters was carried out by several different methods depending on the parameters tested. Stator resistance testing is performed with the measurement of current in the coil which is then obtained by calculating the magnitude of stator resistance as 0.14710296 Ω. Measurements of d-axis stator inductance, q-axis stator inductance, and back emf constant of prototype permanent magnet BLDC motor is obtained as results of 0.35304710 mH, 0.38246769 mH and 0.09690626 Vs/rad respectively. The test results between design and prototype testing were quite good. The difference between the test results
and the design of the prototype test results was caused by incompatibility of material composition although using the same type of material. The evaluation shows the electromagnetic parameters is influenced by its constituent materials.

Keywords:

BLDC Motor, Permanent Magnet, Interior Rotor, Stator Resistance, back-emf, the d-axis inductance, the q-axis inductance

E4C - 8

A DC Motor Speed Control Using The LPC-ANFIS Speech Recognition System

Muhammad Akil[1,a], Ingrid Nurtanio[2,b], Rhiza Samsoe'oed Sadjad[3,c]

[2,3]*Department of Electrical Engineering, Hasanuddin University, Makassar*
[1]*Department of Mechatronic Engineering, Bosowa Politechnic, Makassar*
[a]*akilmuhammad1989@yahoo.co.id,* [b]*ingrid@unhas.ac.id,* [c]*rhiza@unhas.ac.id*

Speech recognition is an interesting research object, it can be used not only as a speech recognition function but also as a control. Firstly the sound which is used as an instruction in control must be extract to get the feature. There are many feature extraction methods, but in this research, it uses Linier Predictive Coding (LPC). LPC method is used to get a characteristic based on the inputs of the sound command such as "Nyala", "Mati", "Lambat", "Sedang", and "Cepat". The databases of the feature extraction are gotten by recording the sound command repeatedly until 5 times from each sound instruction. Then, the database is trained using ANFIS with 50 epochs and getting the training error as 0,00012446 . The result of the first training data is showing between the training data plotting and the ANFIS output are very closer together, so ANFIS can plot the input and output well. The testing result which comes from the respondent in database is getting the average error 0,0502 or around 5% whereas the respondents be sides of database are producing result in average 0,22688 or around 22%. This output can be send to Arduino controller as an input from serial communication, so the input can be processed by controller to put out the PWM signal and transmit to DC motor driver. The examination of the system can expend PWM value as the sound command input.

Keywords:

Control, Speech Recognition, LPC, ANFIS, PWM

An Analysis of Natural Disaster Data by Using K-Means and K-Medoids Algorithm of Data Mining Techniques

Prihandoko Prihandoko[a], Bertalya Bertalya[b], Muhammad Iqbal Ramadhan[c]

Faculty of Computer Science and Information Technology
Gunadarma University
Depok, Jawa Barat, Indonesia
{[a]pri,[b]bertalya}@staff.gunadarma.ac.id, [c]miiqbalrama@outlook.com

Indonesia is one of the countries with diverse morphology of the lands, high mountains, and the tropical climates of frequent high rainfall. This condition often causes natural disasters in some areas of the country, which sometimes are so terrible that make a lot of people are missing and suffering. In order to reduce the impact of natural disasters to the people and environment, a research was conducted by capturing data showing the occurrence of the disasters and data about the weather conditions for the last five years. Data is obtained from the official sites of Indonesian National Board for Disaster Management (BNPB) and Indonesian Agency for Meteorological, Climatological, and Geophysics (BMKG). This data is then analyzed by using clustering data mining techniques i.e. k-means algorithm and k-medoids algorithm. The two methods are frequently used to make some analysis of data to find some hidden informations. The result shows that weather is not the only factor causing natural disaster. By using the result, the government can make some plans for natural disaster mitigations.

Keywords:

k-means algorithm, k-medoids algorithm, natural disaster

The Implementation of Wash, Rinse, and Spin Technique in Accelerometer's Data Processing on Android Smartphone to Generate Stream Keys

Danila Machmud[1,a], Dion Ogi[2,b]

[1]*Lembaga Sandi Negara, Jl. R.M. Harsono 70 Ragunan, Pasar Minggu – Jakarta Selatan 12550, Indonesia*
[2]*Sekolah Tinggi Sandi Negara, Jl. H. Usa Desa Putat Nutug, Ciseeng – Bogor 16120, Indonesia*
[a]*danila.machmud@lemsaneg.go.id*, [b]*dion.ogi@stsn-nci.ac.id*

The needs of random key generator on Android smartphones grow in line with applications which provide cryptographic services. Overcoming this we can use sensor on Android itself to be a key generator, that called Accelerometer sensor. However, raw data generated from this sensor are weak data sources because they have many slow drifts. According to those background, Hong & Liu proposed the protocol that consists of three data-processing techniques, it Wash, Rinse, and Spin. This study implements the protocol by using the accelerometer sensor in android smartphone. It uses SDLC method to build an application. Differentiate process used in Wash step, FFT Radix-2 and SecureRandom() in Rinse step then Pseudo Random Bit Generator (PRBG) based on Chaotic Logistic Map used in the Spin step. Some tests such as Unit, Performance, and Usability testing are conducted to evaluate the application. The uit testing result shows the protocol is properly applied to Android-based random key generator application. The performance testing result show it needs 8.2 milliseconds to generate a 128-bit key. It graphically transforms and shuffles data on vary key's lengths and device condition. It has 4.8 milliseconds average time to save the generated keys into the smartphone's memory.

Keywords:

Random, Android, accelerometer, key, generator

E4D - 3

S-Mbank: Secure Mobile Banking Authentication Scheme Using Signcryption, Pair Based Text Authentication, and Contactless Smartcard

Dea Saka Kurnia Putra[a], Mohamad Ali Sadikin[b], Susila Windarta[c]

Crypto Management National Crypto Institute Bogor, Indonesia
[a]dea.saka@student.stsn-nci.ac.id, [b]mohamad.ali@student.stsn-nci.ac.id, [c]Susila.windarta@stsn-nci.ac.id

Nowadays, mobile banking become a popular tool which consumers can conduct financial transcations such as shopping, monitoring accounts balance, transferring funds and other payments. Consumers dependency on mobile needs, make people take a little bit more interest on mobile banking. The use of one time password which is sent to the user mobile phone by short message service (SMS) is a vulnerability which we want to solve with proposing a new scheme called S-Mbank. We replace the authentication using one time password with contactless smartcard to prevent attackers to use the unencrypted message which is sent to the user's mobile phone. Moreover, it deals vulnerability of spoofer to send an SMS pretending as a bank's server. Contactless smartcard is proposed because of its flexibility and security which easier to bring in our wallet than the common passcode generators. The replacement of SMS-based authentication with contactless smartcard removes the vulnerability of unauthorized users to act as a legitimate user to exploit the mobile banking user's account. Beside that, we use public-private key pair and PIN to provide two factors authentication and mutual authentication. We use signcryption scheme to provide the efficiency of the computation. Pair based text authentication is also proposed for the login process as a solution of shoulder-surfing attack. We use Scyther tool to analyze the security of authentication protocol in S-Mbank scheme. From the proposed scheme, we are able to provide more security protection for mobile banking service.

Keywords:

Secure mobile banking, Two factor authentication, Mutual authentication, Contactless smartcard, Signcryption scheme, Pair based text authentication, Mobile phone, Scyther Tools

E4D - 4

Word Level Auto-correction for Latent Semantic Analysis Based Essay Grading System

Anak Agung Putri Ratna[a], Randy Sanjaya, Tomi Wirianata, Prima Dewi Purnamasari

Department of Electrical Engineering, Faculty of Engineering
Universitas Indonesia
Depok, Indonesia
[a]*ratna@eng.ui.ac.id*

Assessment is an important step in the learning process in which the assessor evaluates students' level of understanding. One model of assessment is essay, which may cause problems in scoring objectivity and performance drop of human body when grading many essays. To ease essay grading and resolve those problems, a system that can assess documents according to its contexts is needed. From this concern, we developed a Java-based system for grading essays in Indonesian language using a more efficient and optimal algorithm. This algorithm consisted of 4 stage. The first stage is Latent Semantic Analysis (LSA), which is used to obtain and conclude the contextual relation of words meaning in a text. The second stage uses Single Value Decomposition (SVD) to obtain scatter variance from the relations. SVD identifies where variances appear at most, therefore is enabled to find the best approach to the original data using reduced dimensions. The third stage is Latent Semantic Indexing (LSI) which is an indexing and retrieval method to identifies patterns in relation between terms and concepts contained in unstructured text collection and results with a vector representing the text. The last stage is Cosine Similarity Measurement (CSM) to obtain similarity value from the text and answer document. To resolve problems stemmed from grammar and vocabulary, in this work we propose an auto-correction technique to check a word from word library for equalization of word with same or no specific meaning. Then, Jaro-Winkler distance algorithm is used to check word errors caused by accident when typing. With the distance, we can determine whether two strings of word are similar. This is extremely important when scanning text with typos, as it will affect the result from LSA. Using this system, the value obtained is similar to the value obtained from human rater. With word library consisting of 97 words for synonym check and 204 function words, the resulting accuracy is 85.246% ± 13.129.

Keywords:

Essay grading, LSA, SVD, LSI, CSM, Jaro-Winkler

E4D - 5

Fast Implementation of AES on Cortex-M3 For Security Information Devices

Rini Wisnu Wardhani[a], Dion Ogi[b], Mohamad Syahral[c], Dedy Septono Catur P[d]

Sekolah Tinggi Sandi Negara
National Crypto Institute
Bogor, West Java, Indonesia
[a]*rini.wisnu@stsn-nci.ac.id,* [b]*dion.ogi@stsn-nci.ac.id,* [c]*mohamad.syahral@stsn-nci.ac.id,* [d]*dedy.septono@stsn-nci.ac.id*

The Advanced Encryption Standard (AES) became the standard for encryption to protect the sensitive information. With the increasing use of portable and wireless devices and demanding information security needs in embedded systems, prompted efforts to find fast software based implementation of AES encryption/decryption capable of running on resource constrained environment in terms of processor speed, code space, energy usage and in particular those portable devices that have 32-bits ARM Cortex-M3 processor. In this paper, we propose an implementation of AES on ARM Cortex-M3 processor with minimum memory will be useful for deploying it in low cost applications. The algorithm is compiled using LPCXpresso IDE targeting into an ARM LPC1769 processor board. The results are presented in this paper for key length of 128 bits. After AES encryption the cipher voice is sent through communication module to another node, while receiving cipher voice through communication module the plain text is obtained by AES decryption.

Keywords:

AES, Embedded System, ARM Cortex-M3, LPC1769, Security Information Devices

E4D - 6

Interference Management Using Power Control for Uplink Transmission in Femtocell-Macrocell Cellular Communication Network

Misfa Susanto[a], Risdawati Hutabarat, Yetti Yuniati, Syaiful Alam

Electrical Engineering Department, University of Lampung, Jl Prof. Sumantri Brojonegoro No. 1, Bandar Lampung 35145, Indonesia

[a]misfa@eng.unila.ac.id

Femtocell is a small cell of 10-30 meters radius deployed in the existing larger cell (macrocell) forming two-tier femtocell-macrocell cellular network. However, the deployment of femtocell into the existing macrocell cellular network is facing more complex interference problems. This paper focuses on interference management using power control methods for the uplink transmission of such two-tier cellular networks. Types of interferences considered in this paper are co-tier (femtocell-tofemtocell and macrocell-to-macrocell), cross-tier (femtocell-tomacrocell and macrocell-to-femtocell), and total interferences. This paper considers multi-cell scenario of cellular communication network consisting of three macrocell cellular networks in which each macrocell is deployed 10 femtocells. This paper analyzes one of three macrocells on the uplink transmission with the other two macrocells on downlink transmissions. All femtocells are on the same transmission conditions as its co-located macrocells. This paper observes one of ten uplink femtocells on the observed uplink macrocell. Through simulation, this paper firstly analyzes co-tier, cross-tier, and total interferences for the system without power control. The results of Signal to Interference plus Noise Ratio (SINR) in term of its Cumulative Distribution Function (CDF) for the system without power control are used as a baseline system. Then, this paper proposes the use of two power controls namely PC-1 and PC-2 in this paper which both power controls work based on the estimated current SINR. Both power control methods are also to make sure that the transmitting power of the users in the observed base stations (eNB/HeNB in 4G cellular network terminology) will not exceed maximum or minimum of its allowed transmitting power (uplink transmission case). The simulation has been carried out and the SINR results were collected and compared to baseline system. The simulation results show that PC-1 and PC-2 outperform the baseline system in terms of CDF of SINR.

Keywords:

Interference Management, Power Control, Cellular, Communication Network, Multi-Cell Scenario, Femtocell, TwoTier, Cellular Network, Uplink Transmission, SINR.

Implementation of RFID Based Raspberry Pi for User Authentication and Offline Intelligent Payment System

Astriany Noer[a], Zulfajri B. Hasanuddin[b], Dewiani Djamaluddin[c]

Department of Electrical Engineering
Universitas Hasanuddin
Makassar, Indonesia
[a]*astrianynoer@gmail.com,* [b]*zulfajri@unhas.ac.id,* [c]*dewiani@unhas.ac.id*

This paper presents an innovation in the implementation of RFID in terms of authentication and offline intelligent payment system in public transport, Bus Rapid Transit (BRT), for the academicians. The authentication is conducted using a contactless smart card as an e-ticket as well as an identity card. Contactless smart cards can be obtained through the registration process on the administrator to store user's identity in specific sectors and provide classified authentication key for the card. Passengers will make the payment on a device that has been previously installed on the BRT, called Contactless Payment Terminal (CPT). CPT consists of Raspberry Pi 3 Model B, MFRC522 and LCD Waveshare 3.5. CPT works without requiring server communication when conducting the transaction, but rather accessing the data stored in the contactless card. The optimum range for the CPT can identify the data on the contactless card is at a distance of 1 cm and 2 cm with a percentage of 100%, the percentage decreased by 86.67% at a distance of 3 cm. The fastest delay time is 0.1 s at a distance of 1 cm and the longest is 2.7 s at a distance of 3 cm. The designed system is also equipped with a website operated by an administrator to register a new user, to edit the user's identity, to top up the user's balances, and to check the transaction history.

Keywords:

RFID, Contactless Smart Card, Raspberry Pi, Intelligent Payment System, Contactless Payment Terminal

E4D - 8

Recommender Engine Using Cosine Similarity Based on Alternating Least Square-Weight Regularization

Indah SurvyanaWahyudi[1,3,a], AchmadAffandi[1,b], Mochamad Hariadi[2,c]

[1]*Departement of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia.*
[2]*Department of Computer Engineering,Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia.*
[3]*Sekolah Tinggi Energi dan Mineral-Akamigas, Ministry Energy and Mineral Resources, Cepu, Indonesia.*
[a]*indah15@mhs.ee.its.ac.id,* [b]*affandi@ee.its.ac.id,* [c]*mochar@ee.its.ac.id*

By the growth of digital data which leads to more complex demands from user to find the information or items. Search engines solve most of the problems but have the drawback, it depends on the query/term that the user enter. The problem appears when the user forget or does not know the query that associated with the items. The Recommendation comes as a solution to provide personal information by studying the interaction of a user, user community, and items that have been recorded previously. Collaborative filtering as a method to provide personalized recommendations based on other users who have similar tastes. However, the results of collaborative filtering tend random, sometimes users need an item with similar genre/subjects. This paper discusses a model of a recommendation engine for new users with a method of collaborative filtering based on genre similarly with the aim of giving the smallest error with high precision. First filter we use Alternating Least Square-Weight Regularization (ALS-WR) is selected as algorithms for collaborative filtering. Second filter we use Cosine Similarity is selected as an algorithm for genre similarity. We use datasets from movielens.org. The RMSE on the first recommendation generated is 0.89 for 100K ratings, 0.86 for the 1M ratings, and 0.81 for the 10M rating.By iterative and training on larger data, it will make a better model, so RMSE can be smaller. They are concluded that ALS-WR able to deliver adaptive, with regulatory parameters that can be controlled and adjusted. The more data but the error on the wane, that is means this algorithm is suitable for growing data or big data. The item that has been sorted with the ALS-WR algorithm, letter approximated with cosine similarity, and with only 10 items movie displays with the highest degree of similarity, that be able to generate high precision.

Keywords:

recommender engine, ALS-WR, cosine similarity, collaborative filtering, big data

E5A - 1

Coverage Test on LBLOCK-DM, LBLOCK-MMO and LBLOCK-MP

Carissa Mega Yulianingrum[1,a], Susila Windarta[2,b]

[1]*Lembaga Sandi Negara*
[2]*Sekolah Tinggi Sandi Negara*
[a]*carissa.mega@lemsaneg.go.id,* [b]*susila.windarta@stsn-nci.ac.id*

In this research, coverage test for the application of the Block Cipher algorithm LBlock on block cipher-based hash function scheme. These schemes are Davies-Meyer (DM), Matyas-Meyer-Oseas (MMO) and Miyaguchi-Preneel (MP). A good hash function are expected to behave like a random mapping. Coverage test is used to determine it. Coverage test evaluates a block cipher algorithm or hash function by calculate the variation of the output produced. The results of the test coverage is evaluated using the chi-square goodness of fit. Results of chi-square goodness of fit is p-value that will be used to determine the conclusion of the study. The conclusion of this study is LBlock algorithm that is applied to DM, MMO and MP schemes are random mapping based on coverage test.

Keywords:

LBlock, Davies-Meyer, Matyas-Meyer-Oseas, Miyaguchi-Preneel, coverage test

E5A - 2

Comparison of SIMON-32 and SIMECK-32 Algorithm with Application in PGV-5 Hash Function Scheme Based on Collision Test and Fixed Point Attack

Sofu Risqi[1,a], Susila Windarta[2,b]

[1]*Lembaga Sandi Negara*
[2]*Sekolah Tinggi Sandi Negara*
[a]*sofurizky@yahoo.com*, [b]*susila.windarta@stsn-nci.ac.id*

One of security service in cryptographic hash function is passed of randomness test and collisions resistant. In this research is done randomness test and collisions resistance on block cipher algorithm SIMON-32 and SIMECK-32 and its application PGV-5 scheme. The randomness test using collision test, while collision resistance using fixed-point attack.
Results of collision test on block cipher algorithm SIMON-32 and SIMECK-32 is a random mapping. In message as a variable control, SIMON-32 start random at round 9 and the SIMECK-32 start random at 12th while key as a variable control, SIMON-32 and SIMECK-32 start random at round-11. The results of fixed point with two types of key variable control and message variable control, both algorithms have a fixed point key or fixed point message that means there is a key or message when used in encryption process, the key or message does not affect results of encryption.
The implementation result of block cipher SIMON-32 and SIMECK-32 on PGV-5 schemes using collision test is a random mapping. The addition of iterations keep produce random mapping based on collision test. While the result of fixed point attack with two types of iterations obtained for initialization vector (IV) is not random and random IV does not guarantee the increasing iteration will decrease the resulting fixed point, so the effect of increasing iterations still produce fixed point relatively the same.

Keywords:

SIMON-32, SIMECK-32, PGV-5, Collision Test, Fixed Point Attack

E5A - 3

Water Level Monitoring Using Ultrasonic-Pipe in Open Channel

Muhammad Fathur Rahman N[1,a], Salama Manjang[2,b], Zahir Zainuddin[2,c]

[1]*Student Department of Electrical Engineering, Faculty of Engineering, Hasanuddin University, Makassar*
[2]*Lecturer Department of Electrical Engineering, Faculty of Engineering, Hasanuddin University, Makassar*
[a]*ficofox@gmail.com,* [b]*salamamanjang@gmail.com,* [c]*zainuddinzahir@gmail.com*

The authors proposed a method for measuring the water level in open channel which is accurate, low cost, and simple. Getting the accurate measurement in open channel is more difficult than in closed channel because there is an influence of external factors such as the formation of the wave, irregular channel structures and floating objects on the water surface. To resolve those problems, a new sensor device is proposed that can measure the water level accurately and simply. The device consists of a combination of JSN-SR04T ultrasonic sensors and iron pipe, it is developed by using ATMEGA328 microcontroller system. The device can measure the water level changes accurately because in a state of stationary and flat. The comparison result between measuring visually and JSN-SR04T ultrasonic sensor is included. This device can record the results of sensor measurements in every second into the SD-card for the purpose of further analysis.

Keywords:

JSN-SR04T, ATmega328, Open Channel, Water Level, Pipe

IoT Spectrum Requirement for Smart Transportation

Diah Kusumawati[1,a], Muhammad Suryanegara[2,b], Sri Ariyanti[1,a]

ICT R&D
[1]Ministry of Communication and Information Technology of The Republic of Indonesia, Jakarta Pusat, Indonesia
[2]Graduate Program of Management of Telecommunications Department of Electrical Engineering, Universitas Indonesia Depok, Indonesia
[a]kusumadiah1991@gmail.com, [b]m.suryanegara@ui.ac.id, [c]sriariyanti07@gmail.com

This paper aims to calculate the Internet of Things (IoT) spectrum requirement of smart transportation supported by LTE mobile technology by taking case study of smart transportation in Jakarta. This calculation is needed due to a prediction of deficiency of 500 MHz mobile spectrum in 2020. We use the method of general LTE planning equation. The results are IoT spectrum needed by smart transportation in Jakarta by 2020 reaches 0.0168 KHz, for smart transportation equipped with a GPS sensor, and grows to 35.48 KHz in order to accommodate an additional CCTV in every bus. Spectrum requirements are increased by 5.94% in 2025.

Keywords:

IoT, smart transportation, spectrum needs, Indonesia, LTE

E5A - 5

Zigbee Based Wireless Sensor Networks and Performance Analysis in Various Environments

Helmy Fitriawan[a], Misfa Susanto, Ahmad Surya Arifin, Danny Mausa, Agus Trisanto

Faculty of Engineering, University of Lampung
Jl. Sumantri Brojonegoro No. 1
Bandar Lampung, 35145, Indonesia
[a]*helmy.fitriawan@eng.unila.ac.id*

To achieve a reliable and robust system for environmental monitoring, there is an available technology that can be used to resolve this problem and moreover provide for better living. Wireless sensor networks (WSN) have been successfully applied in many environmental monitoring. An adhoc wireless sensor network consists of a number of small and self-power sensing devices (nodes) connected using effective wireless networks. Compared to wired networks, there are several challenges that must be addressed in wireless networks. These challenges are limitiation in communication bandwidth and energy constraint in sensor node, therefore it is important to know their realibility and performance. This paper reports the development and performance analysis of an embedded wireless sensor network for temperature and humidity monitoring in the environment. The network itself consists of a coordinator or data gateway which wirelessly collect temperature and humidity data from several sensor nodes that are responsible to provide those data. Each sensor node is developed from an arduino based microcontroller, Xbee wireless module based on Zigbee/IEEE 802.15.4 standards, and temperature and humidity sensor devices. The network quality of service (QoS) is investigated in terms of delay, throughput and packet loss as a function of sensor node distance and transmitted packet size over line of sight (LOS) and non line of sight (NLOS) conditions. The throughput and packet delay are also measured as a function of the baud rate in point to point link. This experiment is performed to have an insight how the baud rate affect the latency of the communication over the Zigbee protocol. Next, we also considered the multi-hop scenario with the presence of router for relaying pakets from the sensor node to the coordinator. The performance of multi-hop configuration is compared to that of direct transmission. Based on our analysis, it is concluded that the Zigbee based WSN is more suitable for low data rate applications.

Keywords:

Performance analysis, Sensor node, Wireless sensor networks, Zigbee, Multi-hop configuration

E5A - 6

Modelling and Analysis e-SIM in Indonesia

Ajib Setyo Arifin[a], Andrianus Pradipta[b], Dadang Gunawan[c]

Electrical Engineering Department
Universitas Indonesia
Depok, Jawa Barat, Indonesia
[a]*ajib@eng.ui.ac.id,* [b]*andrianus.radipta@ui.ac.id,* [c]*guna@eng.ui.ac.id*

Group Special Mobile Association (GSMA) has set a new standard related to embedded Subscriber Identity Module (e-SIM) technology . The application of these technologies aim to support the needs of new services such as Machine to Machine (M2M) and Internet of Things (IoT). Currently several smart phone manufacturers such as Apple and Samsung start to implement the technology to their products. Provisioning of cellular services in Indonesia are not evenly distributed, both the scope and quality of its network and the difficulty when customers switch services. Based on the potential benefit of eSIM, we investigate implementation e-SIM in terms of the number of subscriber, Average Revenue per User (ARPU), and cost production. We forecast the number of subscriber using S-curve model, while ARPU and cost production using Quadratic models. We show there are only 19 million new subscribers between 2015 - 2020 if Indonesia do not implement e-SIM. However, the new subscribers are being double if Indonesia implement e-SIM in the same period. Moreover, ARPU are estimated being large as Indonesia implement e-SIM because e-SIM enables IoT devices.

Keywords:

e-SIM, forecasting, subscriber, ARPU, cost production

Design and Control of a 10kW Three-Phase Grid-tied Back to Back Inverter

Woei-Luen Chen[1], Chun-Yuan Chen[2], I-Chyn Wey[2], Yu-Ping Chou[2]

[1]*ElectroPhysics, University of Taipei, Taipei, Taiwan*
[2]*Dept. of Electrical Engineering, Chang Gung University Tao-Yuan, Taiwan*

Inverters in back to back (B2B) connection are utilized to convert the voltage and frequency of the power source to another format. Typical application of inverters is the wind power system. This study presents a B2B inverter for equal voltage and frequency format conversion in which one inverter works to get power from the grid to charge the DC capacitor and another inverter returns most of the active power back to the grid and retain a few power to maintain the DC-link voltage. The power grid affords only the power loss of the inverters, which benefits the test of the inverter rated above 10kW under general distribution line. A proportional-resonant (PR) controller in a stationary frame in place of a proportional-integral (PI) controller in a synchronous frame was adopted to condition the B2B inverter AC current for grid connection due to the advantages such as instantaneous tracking capability as well as low-cost computational resources. To mitigate the startup transient for grid connection, the instantaneous grid voltage was feedforwarded to the inverter voltage command. The B2B inverter was run according to the proposed control strategy under various conditions such as the reactive power control and the active and reactive power controls. Experimental results show that the power returns to the power grid is close to originally put in and the proposed B2B inverter can be tested under the distribution line with the power capability over 10kW.

Keywords:

active power, proportional-resonant control, reactive power, voltage-sourced Inverter

E5B - 2

Load Frequency Control with Economic Dispatch in Power System

A K M Kamrul Hasan[1,a], Shovajit Saha[2,b], Md. Al-Amin Sarker[2,c], Silvia Naznin Nupur[2,d]

[1]*Lecturer, Department of Electrical and Electronic Engineering, Southeast University, Dhaka, Bangladesh.*
[2]*Department of Electrical and Electronic Engineering, Southeast University, Dhaka, Bangladesh*
[a]*kamrul_2075@yahoo.com,* [b]*shuvojitsaha398@gmail.com,* [c]*alamin.sarker35@gmail.com,* [d]*silvianaznin030@gmail.com*

Maintaining frequency of power generated from intermittent source is a challenging job. Even in conventional power plant it is intriguing to give an outline for controlling the frequency as well. This research will underscore frequency aware economic dispatch (FAED) with the coordination of security constrained economic dispatch (SCED) and load frequency control in an interconnected power system. Simulation based performance optimization inherent of the load frequency control (LFC) and SCED are fully considered without simplifying assumptions.

Keywords:

Frequency aware economic dispatch (FAED), Load frequency control (LFC), Security constrained economic dispatch (SCED), Economic dispatch (E

Lighting Replacement Analysis at Classrooms of Engineering Center, Faculty of Engineering, Universitas Indonesia

Muhammad Levy Aninditio[a], Amien Rahardjo

Departemen Teknik Elektro, Fakultas Teknik, Universitas Indonesia, Kampus UI, Depok, 16424, Indonesia
Email: [a]muhammad.levy@ui.ac.id

The energy crisis in the future will be a threat for human life. Many advancement of technology currently focus on creating something that perform better than its predecessor but consuming less power. LED lighting technology has been introduced as a breakthrough of technology which possesses big advantages over the other lighting technology. LED lighting technology is able to produce a high luminous flux with very low power consumption, and also lasts longer than others. By consuming lower power, hence the amount of energy being consumed in order to generate the same amount of light will be reduced, and hence, energy saving will happen. This undergraduate thesis discusses replacement analysis of lighting at classrooms at Engineering Center of Faculty of Engineering Universitas Indonesia. The analysis is in terms of illuminance aspect, power quality performance and cost, and it is done by replacing the existing CFL with three different options of LED lamp exist in the market with competitive price. The study suggests that using LED lamp as a replacement for CFL at classrooms at Engineering Center of Faculty of Engineering Universitas Indonesia is more efficient; consuming less energy by 42.86%, and moreover saving the electricity cost as well, from IDR 864,360 annually to IDR 493,920.

Keywords:

LED lamp, replacement analysis, efficiency

E5B - 4

Total cost of ownership analysis of 60 MVA 150/120 kV power transformer

Agus Indarto[1,2], Rudy Setiabudy[2], Iwa Garniwa[2], Chairul Hudaya[2,a]

[1]*Electric Power and Energy Studies, Department of Electrical Engineering, Faculty of Engineering Universitas Indonesia, Kampus Baru UI Depok 16424, Republic of Indonesia*

[2]*PT. CG Power Systems Indonesia, Kawasan Industri Menara Permai Kav. 10, Jl. Raya Narogong, Cileungsi,Bogor 16820, Indonesia*

[a]*c.hudaya@eng.ui.ac.id*

Power transformer (PT) is one of the most important parts in electrical power system. In some cases, many electric utilities do not consider to capitalize the power losses, resulting in uneconomical decision during the purchasing. In this study, to evaluate the best purchase choice of a 60 MVA 150/129 kV PT, we examine the total cost of ownership (TCO) as the basis for determining the total economic value of PT. When purchasing and designing the PT, the optimum parameters are not only solely determined by the design and the lowest cost, but also influenced by material cost, power losses and its typical operation. Hence, design optimization and calculation of TCO of PT is of importance to provide a reliable and economical product. Here it is realized by reviewing the existing design and fabrication as well as the cost structure, design optimization and total cost ownership calculation. The result shows that the PT design optimization employing losses capitalization exhibits the most economical value, reducing TCO up to 3%. We found that the losses capitalization and TCO of PT are sensitively affected by interest rate, economic life of PT, electricity cost, load factor and losses. Those factors are key components to determine the suitable specification, design evaluation and operation of the transformer. This practical study is beneficial both for the owner and manufacturer of PT, thus giving the right specification and design to support purchasing process of PT.

Keywords:

total cost of ownership, power transformer, optimum design, losses capitalization

E5B - 5

Utilization of idle power plant for own use and excess power in an oil-and-gas company

Yosi Ohira, Yoyok Dwi Setyo Pambudi, Chairul Hudaya[a]

Electric Power and Energy Studies, Department of Electrical Engineering,
Faculty of Engineering Universitas Indonesia
Kampus Baru UI Depok 16424, Republic of Indonesia
[a]*c.hudaya@eng.ui.ac.id*

The Indonesian government (GoI) applies the cost recovery concept in the upstream sector of the oil and gas resources. It postulates the expenses spent by the contractor during exploration and exploitation activities will be settled through production sharing scheme. The cost includes the compensation for the production equipment and utilities, not to mention the power generator. When the oil-and-gas exploitation declines or even shut-in due to technical and economic reasons, some of them become idle assets. In this study, we investigate the utilization of the idle 2 x 750 kVA gas engine power generators for a new gas facilities project in different region. As the newly facilities require a smaller power supply (2 x 350 kVA) than the power plant capacity, the excess power is proposed to be sold to the electric utility. Here, an economic analysis is carried out to compare between purchasing new power generators and the utilization of the idle ones. The result shows that the utilization of idle asset provides economic benefit both for the GoI and the contractor. This scheme will solve the electricity need for own use and the excess power may be transferred to the electric utility, realized by power purchase agreement.

Keywords:

idle asset, cost recovery, oil-and-gas industry, power plant, excess power, own use power;

E5B - 6

Secondary Voltage Control of Single Phase Induction Generator Operated in Small Scale Picohydro Power Plant at Off-Grid Area

Widodo Pudji Muljanto[a], Rinaldy Dalimi[b]

Electrical Engineering Department
Engineering Faculty of Universitas Indonesia
Depok, Indonesia.
[a]widodopm@yahoo.com, [b]rinaldy@eng.ui.ac.id

The usage of monoblock single phase electric water pump for small-scale electric power generation at the off-grid area is beneficial in terms of cost, ease of construction, availability of spare parts and in terms of reliability. The problem found is the difficulty to maintain the output voltage and frequency of single-phase induction motor when operated as an electric induction generator especially during fluctuation of the load due to the un-linearity behaviour of the induction machine. The common way to control voltage and frequency is applying electronic load controller by adjusting dummy load power to compensate the fluctuation of the real load. This research proposes additional secondary voltage control on the system by adjusting the capacitance value of the capacitor connected to the auxiliary winding in order to compensate the fluctuation of the output voltage.

Keywords:

Renewable energy, Monoblock electric pump, Single-Phase Induction Generator, Secondary Control

Modified Elman Recurrent Neural Network for Attitude and Altitude Control of Heavy-lift Hexacopter

Bhakti Yudho Suprapto[a], Amsa Mustaqim[b], Wahidin Wahab[c], Benyamin Kusumoputro[d]

Department Electrical Engineering
Universitas Indonesia
Kampus baru UI Depok, Indonesia
[a]*bhakti.yudho@ui.ac.id,* [b]*amsamustaqim@hotmail.com,* [c]*wahidin.wahab@gmail.com,* [d]*kusumo@ee.ui.ac.id*

Hexacopter is a member of rotor-wing Unmanned Aerial Vehicle (UAV) which has 6 six rotors with fixed pitch blades and nonlinear characteristics that cause controlling the attitude of hexacopter is difficult. In this paper, Modified Elman Recurrent Neural Network (MERNN) is used to control attitude and altitude of Heavy-lift Hexacopter to get better performance than Elman Recurrent Neural Network (ERNN). This Modified Elman Recurrent Neural Network has a self-feedback which provides a dynamic trace of the gradients in the parameter space. In the self-feedback, the gain coefficients are trained as connection weight. This connection weight could enhance the adaptability of Elman Recurrent Neural Network to the time-varying system. The flight data are taken from a real flight experiment. Results show that the Modified Elman Recurrent Neural Network can increase performance with small error and generate a better response than Elman Recurrent Neural Network.

Keywords:

Direct Inverse Control, Elman Recurrent Neural Network, Heavy-lift Hexacopter, Modified Elman Recurrent Neural Network

E5C - 2

Adaptive PID Controller Based on Additional Error of an Inversed-Control Signal for Improved Performance of Brushless DC Motor

Muhammad Rif'an, Feri Yusivar, Benyamin Kusumoputro[a]

Department of Electrical Engineering
Faculty of Engineering, Universitas Indonesia
Depok, Indonesia
[a]*kusumo@ee.ui.ac.id*

The Brushless DC (BLDC) motors are widely used for many industrial applications because of their high efficiency, high torque and low volume. However, the BLDC motor is a multi-variable and non-linear system, so it is difficult to get a satisfying result for BLDC motor using the conventional linear control method like normal PID controller. This paper presents the development and performance analysis of adaptive PID controller Based on Additional Error of an Inversed-Control Signal for Brushless DC motor drives. The adaptive PID controller Based on Additional Error of an Inversed-Control Signal have a parameter adjustment mechanism, better solutions when there are variations in process parameters, learning capabilities and fault tolerance. This paper implement adaptive PID controller Based on Additional Error of an Inversed-Control Signal to solve the problems of non-linearity, parameter variations and load excursions that occur in BLDC motor drive systems. The performance of the traditional PID controller based speed control method is compared with the model reference based speed control for BLDC motor drive system using MATLAB software. Experimental results is presented to prove that the adaptive PID controller Based on Additional Error of an Inversed-Control Signal is capable of speed tracking as well as reduce the effect of parameter variations.

Keywords:

Adaptive PID, Single Neuron PID, Neural Network, BLDC

The Use of PID Controller to Get the Stable Floating Condition of the Objects in Magnetic Levitation System

Rosalia H Subrata[a], Julian Leonard Hardenberg[b] and Ferrianto Gozali[c]

Electrical Engineering Department
Faculty of Industrial Technology, Trisakti University
Jakarta, Indonesia
[a]rosalia@trisakti.ac.id, [b]julianleonard41@gmail.com and [c]ferrianto@trisakti.ac.id

Magnetic Levitation or maglev is a method to make an object float in open air without any physical support utilizing force created by electromagnetic repulsion surrounding the object to counter the effect of gravitational force of the object. The object can be levitated if the force created by electromagnetic repulsion equalizes the weight of the object. Lately, this method can be found in many applications such as maglev trains, maglev toys, maglev clock, etc. In this research, we want to show how the Proportional Integral Derivative Controller also known as PID Controller can be used to stabilize magnetically levitated objects. The electromagnetic field is generated by using copper wire coil with 15 miliHenry inductance while the object consists of two neodymium permanent magnetic button. The weight and the size of the magnet is 22 gram in mass with 0.5 cm in diameter and 0.5 cm thick. An N-Channel MOSFET Transistor is used to adjust the position of the object with the electromagnetic coil. The PID Controller is used to find the characteristics of the system. The system will stabilize objects floating in many different positions. Arduino Uno microcontroller is used to perform the PID Controller processing with the feedback from the Hall Effect sensor of the system. It is found that with PID parameters Kp = 2.1 Ki = 19.5 and Kd = 0.0025, the objects can be floating with stable condition at the position 1.5 cm from effect hall sensor and with Kp = 0.6, Ki = 3.0 and Kd = 0.0006, the objects can be floating with stable condition at the position 2.0 cm from the Hall Effect sensor. The range in which objects can float with stable condition is between 0.5 cm and 2.5 cm from the Hall Effect sensor of the system.

Keywords:

Magnetic Levitation, PID Controller, Arduino, floating, set point

E5C - 4

Performance Simulation of I-PD Based ADCS for Earth Observation Micro Satellite

Abdul Halim[a], Muhammad Sulaiman Nur Ubay[b]

Unversitas Indonesia,
Depok, Indonesia
[a]a.halim@ui.ac.id, [b]m.sulaiman51@ui.ac.id

The use of micro satellite for earth observation has growth significantly. Some industries and research institutions around the world develop its technologies. One of the important micro satellite technologies is Attitude Determination Control System (ADCS). ADCS typically consists of three operation modes which are initialization mode, detumbling mode and normal mode. These modes effect satellite attitude orientation determination. Due to the complexity of satellite orientation dynamics, design of ADCS becomes more complex and it is not easy to test the performances. In this paper, a simple ADCS design is conducted and its performance is evaluated. ADCS is designed based on I-PD type control which its parameters are determined in order for making satellite orientation tracking to preset direction. In this paper computer based satellite simulator is also developed by using mathematical model which its parameters are obtained from real satellite system. The simulator consists of some modules including reaction wheels, power supply system and onboard data handling systems. In order to test the performance of proposed ADCS, detumbling test and target pointing test is conducted. From simulation results, it is obvious that I-PD based ADCS has shown good enough performance.

Keywords:

micro satellite, earth observation, Attitude Determination Control System, I-PD Control, simulator, performance

E5C - 5

Hand Typist Robot Modelling For Quadriplegic Person Using Extreme Learning Machine

Dimas A. Kurniawan[1], Mat Syai'in[1], S. Kautsar[4], M. Khoirul Hasin[1], Boedi Herijono[3], J.Endrasmono[1], R.T.Soelistijono[3], Aang Wahidin[3], L. Subiyanto[2], A.S.Setyoko[2], Adi Soeprijanto[5]

[1]*Automation Eng. Study Program, Shipbuilding Institute of Polytechnic Surabaya (SHIPS) / Politeknik Perkapalan Negeri Surabaya, Indonesia*
[2]*Marine Electrical Eng. Study Program, Shipbuilding Institute of Polytechnic Surabaya (SHIPS) / Politeknik Perkapalan Negeri Surabaya, Indonesia*
[3]*Shipbuilding Eng. Study Program, Shipbuilding Institute of Polytechnic Surabaya (SHIPS) / Politeknik Perkapalan Negeri Surabaya, Indonesia*
[4]*Politeknik Negeri Jember, Indonesia*
[5]*Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia*
[a]*dimasandykurniawan@gmail.com,* [b]*matt.syaiin@gmail.com,* [c]*kautsar.sam@gmail.com*

This paper will present an implementation of Extreme Learning Machine (ELM) in Prototype of Hand Typist Robot (HTR). HTR is Typist Robot which is designed for quadriplegic people. HTR consists of two robotic arms with three dynamixel AX-12 that mounted on each arms. It is mean that each arm has 3 DOF. To operate HTR, user has to equiped with compass sensor (CMPS10), installed on the part of body that has good function. In this paper ELM is used to map and make decision between the signal which sending by CMPS10 and position of alphabeth that will be reached by Robot Arm. The advantage of ELM is superior in training process and easy to implement. Using ELM, the relationship between input and output can be present only using one simple matrix. From the experiment result shown that 73 keys of computer keyboard can be reached by HTR with an error 5% . The error is accumulated errors which is caused by vibration of dynamixel AX-12 when it is moving. To minimize the error the HTR need to reset regularly.

Keywords:

Compass sensor (CMPS10), Degrees of Freedom (DOF), Dynamixel AX-12, Extreme Learning Machine (ELM), Foldable keyboard, Hand Typist Robot (HTR), Quadriplegic person.

E5C - 6

Two-stage Least Square Method for Model Identification of Vehicle Motion

Yusuf Lestanto[a], Aries Subiantoro[b], Feri Yusivar[c]

Department of Electrical Engineering
Universitas Indonesia
Depok, Indonesia
E-mail: [a]yusuf.lestanto@ui.ac.id

Vehicle dynamics have tremendeous complex characteristic and nonlinear behaviour. Vehicle dynamics are decomposed of many internal and external components which influence vehicle stability. External components come from environment such as wind forces, surface coarse of road, lane bend or sudden manouver, which will change the value of vehicle stability parameters, i.e. yaw rate and sideslip. Both are influenced by the longitudinal velocity change and are difficult to be measured by installed sensors in vehicle. For driving convenience and high safety performance, the vehicle stability parameters must be controlled. Researches and experiments directly on the vehicle bring quite expensive cost and huge time consuming. Therefore, before doing experiments to the real vehicle, simulation is taken. Simulation needs model of vehicle dynamics that are approaching real vehicle dynamics. In this paper, instead of using simple vehicle model, the replication of the vehicle dynamics has been taken from CarSim multi-degree of freedom vehicle model. CarSim's vehicle model C Class Hatchback Sprungmass 2012 is used in this simulation. All vehicle parameters are already provided by CarSim. Vehicle model run along defined part of vehicle track of Universitas Indonesia. At certain bend lane, the obtained data consists of steering angle, longitudinal forces to all four wheels, yaw rate and side slip angle. Two-stage Least Square method has been applied to those data in order to estimate vehicle dynamics. The estimated model was validated upon another data. The result shows that the estimated vehicle model could represent in approaching real vehicle dynamics. The estimated model has perfect controllable and observable characteristic. The model is stable and its eigenvalues is inside unit circle.

Keywords:

Keywords, Yaw rate, side-slip, two-stage least square, lateral vehicle dynamics, longitudinal vehicle dynamics, controllable and observable

E5C - 7

Fuzzy-Appearance Manifold and Fuzzy Nearest Distance for Face Recognition on Various Poses and Degraded Images

Muhammad Adi Nugroho[a], Benyamin Kusumoputro[b]

Department of Electrical Engineering
University of Indonesia
Depok (West-Java), Indonesia
[a]Muhammad.adi21@ee.ui.ac.id, [b]kusumo@ee.ui.ac.id

This paper introduces an approach to recognize face from 3D space on 2D image using fuzzy vector manifolds and nearest distance. We employ fuzzy vector to help the system minimize negative effect coming from noise and image degradation. On the training set, crisp vector representation of images will be transformed to its fuzzy vector representation using a specific triangle fuzzification method. Then, a linear interpolation method will be used to construct a manifold, making the system able to cope with pose variation across data. In the testing phase, we transform every unknown data image to its fuzzy-vector representation using the parameter we obtained from training phase. We then project the unknown fuzzy vector to the manifolds using a technique called fuzzy nearest distance. The output of the system will be the index of manifold that the data mostly belong to, in this case the prediction of person. This system is applied to recognize photos on our databases which some of them are influenced by noises. Experiment result show that the system is able to recognize person on 98% success rate, with a 3% reduction if noises were added.

Keywords:

face recognition, image noises, fuzzy vector, fuzzy line interpolation, fuzzy manifold, fuzzy nearest distance

Open Loop Fiber Optic Gyroscope Analysis Based on Angular Random Walk

Dewi Anggraeni[1,2,a], Purnomo Sidi Priambodo[1,b]

[1]*Department of Electrical Engineering, Universitas Indonesia*
[2]*Aeronautics Technology Center, LAPAN, Indonesia*
[a]*dewi.anggraeni@lapan.go.id,* [b]*p.s.priambodo@ieee.org*

Open-loop Fiber Optic Gyroscope (OFOG) is an optical sensor instrument for measuring and calculating the motion of the angular position of a body object. OFOG works based on Sagnac effect, which states that the phase shift between the two opposing waves propagate in a rotating optical ring interferometry, is proportional to the angular velocity. One indicator of a good performance measurement system is accuracy that means immune to noise. Angular Random Walk (ARW) is one type of noise to be discussed in this paper and mostly caused by spontaneous photon emission and high speed data sampling noise. This research is to analyze ARW noise variety statisctic, to make a direct equation system and its inverse equations to be useful to suppress the error.

Keywords:

OFOG, angular velocity, Sagnac effect, ARW noise, optical ring interferometry

The Effect of Waveguide Parameters on GaN-based S-bend Y-junction Optical Power Divider

Retno Wigajatri Purnamaningsih[1,a], NR Poespawati[1], Tomy Abuzairi[1],Sasono Rahardjo[2], Maratul Hamidah[2], and Elhadj Dogheche[3]

[1]*Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, 16424 Depok, Indonesia*

[2]*Center of Technology For Electronics, Agency for The Assessment and Application of Technology, Puspitek 15314, Indonesia*

[3]*Institute of Electronics, Microelectronics, and Nanotechnology, IEMN CNRS University of Valenciennes, Le Mont Houy, F-59309, Valenciennes, France*

[a]*retno@eng.ui.ac.id*

GaN-based structures have attracted many researchers in developing photonic devices. These semiconductor structures can operate at high temperatures and high power levels due to their mechanical hardness. So far, optical splitters design based on Y-junction splitters are widely used on the various material structure. The problem of these structures is radiation loss at the junction area. In this paper, we study the effect of various waveguide parameters on GaN-based S-bend Y-junction optical power divider. The design consists of three sections: linear rectangular rib waveguide, parabolic taper and two S-bend sine branches with the total length of 1000µm. We use optical beam propagation methods (BPM) to obtain the characteristic of the guided wave to calculate the field propagation through the structure as a function of waveguide parameters, such as branching angle and input wavelength. All simulations are carried out using the OptiBPM software. From the simulation results, it shows that to maintain 90% transmitted power, the branching angle for the design should be at the range of 0.5-1.5º. It is also demonstrated that the transmitted power almost stable through the wavelength range from 1.5 up to 1.6 µm with an average of power loss at about 0.35 dB. The simulation results presented can be applied for future GaN Yjunction based waveguide photonic devices design.

Keywords:

GaN-based structure, Optical power divider, S-bend, Y-junction, BPM

E6A - 3

Comparison of Coupling Coefficient Variation Effects on Double Couplers Structured Single Ring Resonator with Single and Double Beams Injection

Maratul Hamidah[1,2,a], Sasono Rahardjo[1], Retno Wigajatri Purnamaningsih[2], Nji Raden Poespawati[2], Purnomo S. Priambodo[2]

[1]*Center of Technology for Electronics, Agency for the Assessment and Application of Technology, Puspiptek Tangerang Selatan, Indonesia*
[2]*Department Electrical Engineering, Universitas Indonesia, Depok, Indonesia*
maratul.hamidah@bppt.go.id

Ring Resonator has become one of the most interesting research topics nowadays since this device has high finesse value at resonance frequency and high sensitivity as well. There have been many scientific publications in the device's characteristic dynamic conditions, structures (single, multi and combination), and their applications as well, such as sensors, filters and others. The performance characteristics of double coupler structured single ring resonator has been discussed so far but the effect of coupling coefficient variation has not been discussed yet. Meanwhile, in previous research we have investigated the effect of coupling coefficient variation on single coupler structured single ring resonator. Now, we explore further the effect of coupling coefficient variation on the power transfer function output of a double couplers structured single ring resonator. Besides, single beam and double beams inputs are utilized to get the transmission powers as the output characteristics from both of drop and through ports of the ring resonator. The simulation results show, for the drop port output, as the higher coupling coefficient is, the peak of the power transfer function output gets higher for both the drop port output of single beam input and double counter directional inputs, but the double counter directional inputs, shows the peak of the power transfer function output much higher compared to its of the single beam input. Meanwhile for through port output, the result with double parallel inputs configuration shows a bit different behavior with its of single beam configuration, where as the result of the double parallel input configuration exhibits peak of the power transfer output almost similar to the simulation result utilizing single ring resonator with single coupler configuration that has already published previously. This simulation works may be useful in the design of resonator performance when transmission power is one of the important parameters to be considered.

Keywords:

Double Couplers Ring Resonator, Coupling Coefficient, Single-Double Beams Input

E6A - 4

Study on Electro-Optic Modulator Based Distributed Antenna System over WDM PON System

Y. Natali[a], P. S. Priambodo[b], E. T. Rahardjo[c]

Department of Electrical Engineering
Universitas Indonesia
Depok, Indonesia
[a]*yusnatali71@ui.ac.id*, [b]*p.s.priambodo@ieee.org*, [c]*eko@ee.ui.ac.id*

WDM PON is used to increase Distributed Antenna System (DAS) network efficiency applied in existing PON network. The Optical DAS is the best solution for power efficiency in the building. Both DAS and PON used WDM to combine the different optical wavelengths. The experimental network configuration locates the WDM de-multiplexer placed 18 km from the multiplexer. After 18 km, the optical network is divided into two networks, which are DAS and FTTH GPON. This paper proposes to use 2x1 WDM PON type for DAS. In this paper, an electro optic modulator has a function as donor antenna in DAS system. The experimental DAS and FTTH configuration system is simulated using Optisystem software. DAS link is 20 km from donor antenna and FTTH link is 40 km from OLT to ONU. The results of Optisystem simulation shows that photodetector output is -34.071 dBm for DAS. While the power input of ONU in PON network is -21.5 dBm. OSNR of WDM multiplexer are 69.421 dB for FTTH and 75.922 dB for DAS. The results comply with the standard of ITU-T G.984.2 for GPON System and data reference. While the EOM as donor antenna gives power efficiency for DAS system.

Keywords:

wavelength division multiplexing, distributed antenna system, electro optic modulator, fiber to the home, gigabit passive optical network

E6A - 5

Near-field to Far-field Transformation of Cylindrical Scanning Antenna Measurement Using Two Dimension Fast-Fourier Transform

Catur Apriono, Nofrizal, Mochamad Dandy Firmansyah, Fitri Yuli Zulkifli, Eko Tjipto Rahardjo

Antenna Propagation and Microwave Research Group (AMRG),
Department of Electrical Engineering, Faculty of Engineering Universitas Indonesia,
Kampus Baru UI Depok, Depok, Indonesia

Radiation characteristics of an antenna should be tested through a precise measurement procedure. To provide an actual parameter of an antenna radiation, measurement must be performed in the far-field region and its distance is proportional to the antenna's dimension. Therefore, in a limited space of an anechoic chamber facility, antenna measurement has a constraint to a maximum dimension of the antenna under test. Near-field measurement method has been an alternative to overcome this problem. However, additional techniques, such as sampling, scanning mechanism, transformation computation, cannot be avoided to obtain the actual antenna radiation parameters. In this research, we study cylindrical scanning technique to obtain sampling data because it is simpler than the spherical scanning in mechanical setup and can produce radiation pattern results in completely two dimension polar diagrams. Our purpose is to provide low cost and reasonable performance of a near-field measurement system. Two dimension Fast-Fourier Transform is used to process and analyze the near-field data into the far-field data. Other methods, i.e. one dimensional Fast-Fourier transform and numerical method, are also performed to compare the accuracy and efficiency of the proposed method. Near-field data generated from experiment data measured of 8-array micro-strip antenna at resonant frequency 3.35 GHz. Transformation results show that average deviations of one dimension Fast-Fourier Transform, two dimension Fast-Fourier Transform and the numerical method are 6.83 dB, 3.04 dB, and 3.77 dB, respectively. These results show the minimum discrepancies between the transform and the expected far-field obtained by using the two dimensions Fast-Fourier Transform. This method has shown near-field measurement and transformation can predict the farfield radiation characteristics.

Keywords:

near-field, far-field, Fast-Fourier, cylindrical, transformation

E6A - 6

Broadband Planar Bow-Tie Antenna on High Resistivity Silicon Substrate for Terahertz Application

Teguh Wahyudi, Catur Apriono, Fitri Yuli Zulkifli, Eko Tjipto Rahardjo

Antenna Propagation and Microwave Research Group (AMRG)
Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia
Depok, Indonesia

Terahertz (THz) wave frequency region is part of the electromagnetic spectrum. This spectrum is located between 0.3 THz to 10 THz or between radio waves and optics. The THz frequency region has potentials in many different applications, such as imaging, spectroscopy, and wireless communication. However, some problems are still remaining and should be solved to develop THz technology system for an actual use, such as expensive fabrication facilities, lack of recent device performances, and low speed measurement process. This research proposes a bow-tie antenna in the THz region to provide wideband bandwidth for THz broadband applications. This antenna uses high resistivity Silicon material a substrate and Gold metal layer in a specified pattern as a radiating element. The initial bow-tie antenna design is elaborated by combining a capacitive bar technique placed near the antenna feed gap to improve return loss and wide bandwidth. This research is conducted by using the calculation method to analyze the initial antenna model and simulation by using commercial simulator software of CST Microwave studio to perform design optimization. The initial antenna before combined with the capacitive bar has a resonant frequency of 1 THz with return loss (RL) at -11 dB, and bandwidth 114.6 GHz from VSWR equal 2. The results from the THz bow-tie antenna combined with the capacitive bar show resonant frequency at 1 THz with RL at -40 dB, and bandwidth 457.47 GHz from VSWR equal 2. The capacitive bar technique has been successfully improved more bandwidth and better resonant frequency at 1 THz.

Keywords:

Terahertz, Broadband, Bow-tie, Capacitive Bar, Silicon High Resistivity

E6A - 7

Static and Dynamic Magnetic Fields Scattering on a Mini Magneto-static Flux Manipulator for Wireless Power Transfer

Teti Zubaidah[a], Bulkis Kanata, Paniran, Ahmad Yani

Research Group on Applied Electromagnetic Technology
Electrical Engineering Department, University of Mataram
Jl. Majapahit No. 62, Mataram – Lombok, INDONESIA
E-Mail: [a]tetizubaidah@unram.ac.id

A series research has been conducted during 2012 – 2015, attempting to harvest abundant geomagnetic energy in Lombok island - Indonesia, resulted in three constructions of magneto-static flux manipulators, which are intended to be used for geomagnetic power plant that operates based on wireless power transfer method. Here we present the third generation of manipulator, namely 'mini magneto-static flux manipulator', which consists of three concentric shielding sheets with diameters of 18.5 cm, and each sheet has 8 identical holes. Scattering of static and dynamic magnetic fields are tracked to determine the pattern of flux distribution alterations, caused by opening and closing of shielding holes. Measurements are taken in a semianechoic chamber with SPECTRAN NF 5035□ and a pair of Helmholtz coils induces a nearly homogenous magnetic field which patterns have been three dimensional mapped in a previous research. Data of static and dynamic magnetic flux densities (each consist of 30 sample) are retrieved on 288 points for non-shielding (initial) condition and 1815 points for hielding (open and close) condition, with regular grid along 30 cm in x-, 20 cm in y-, and 20 cm in z-axis directions. Two dimensional slices are generated from three dimension maps of 1D orthogonal (x-direction) as well as 3D total component flux densities. Results show that placing of a mini manipulator also opening and closing of its shielding holes will alter magnetic field distributions in the shielded region. Even further it can convert static fields to dynamic ones. Therefore, mini magneto-static flux manipulators are more suitable to be applied for the next construction of geomagnetic power plant, considering their efficiencies which are higher than large scale manipulators.

Keywords:

Manipulator, magnetic fields, geomagnetic, Helmholtz coil, Wireless Power Transfer (WPT), Lombok island

E6A - 8

Engaging Community in Developin Electrical Wind Power in Rembitan Village, Central Lombok

Teti Zubaidah[a], Bulkis Kanata[b], Made Sutha Yadnya[c]

Research Group on Applied Electromagnetic Technology
Electrical Engineering Department, University of Mataram, Jl. Majapahit 62 Mataram, Lombok – INDONESIA
E-mail: [a]tetizubaidah@unram.ac.id, [b]uqikanata@te.ftunram.ac.id, [c]msyadnya@unram.ac.id

The Rembitan village is located in the Central Lombok district, with topography of hills on elevations of 250 - 300 m. A grant for community service (Ipteks bagi Masyarakat - IbM) is focused on this village towards an energy independent village by means of electricity from wind energy. These activities are intended to strengthen the relationship between the University of Mataram and the village community, as well as to empower the local communities to supply their electricity needs. The activities are considered very appropriate, considering that Rembitan is close to the South coast of the Lombok island, with high wind energy potential that unexploited up today. Activities will also be in a close relevance to the needs of local communities, since the availability of electrical energy in the village is not yet fully equitable. The provision of an independent electrical energy from wind power is also expected to be a solution for social and economical problems. A wind turbine with capacity of 1 kWp has been installed sucessfully in Rembitan village. By using additional installation of batteries, inverter, and charger controller (MPPT), it can be used to supply lighting loads and water pump. In the meantime, the University of Mataram has operated the Lombok Geomagnetic Observatory since 2014 in Rembitan village, in cooperation with the Deutsches GeoForschungsZentrum (GFZ) Germany and the Government of Central Lombok District. Considering the importance of this observatory for the purpose of earthquake mitigation, it is indispensable for realizing mutualism relationship with the local communities to sustain its operations. Following some other previous community services in Rembitan village, the current activities through IbM 2016 should also be a part for strengthening the mutual relationship.

Keywords:

Wind power, Electricity, IbM, Rembitan village, Lombok.

Study Trends and Challenges of the Development of Microgrids

Rina Irawati[1,a], Heri Suyanto[2,b]

[1]*Research & Development Center for Electricity New, Renewable Energy and Energy Conservation Technology, Research & Development Agency of Ministry of Energy & Mineral Resources Republic of Indonesia, Jl. Ciledug Raya Kav.109, Jakarta Selatan Indonesia 12230*

[2]*Lecturer, College of Engineering – PLN (Foundation for Education & Welfare PT. PLN (Persero)). PLN tower. Jl. West Outer Ring Road, Duri Kosambi, Cengkareng, Jakarta Barat Indonesia 11750*

[a]*rina.irawati@esdm.go.id,* [b]*heri.suyanto@yahoo.com*

With the global energy crisis and the increasingly serious environmental problems, renewable energy becomes a future energy trends. As an important form of renewable energy used, distributed generation (DG) has been rapid development in the world. However, large scale integration of DGs will bring operating and challenges to the power system network. A microgrid is an important means to this problem, and gained much attention worldwide. This paper introduces the basic concept of microgrid, and analyze the new trends and challenges of the development of microgrids, as well as some technologies. These trends and challenges include higher renewable energy integration, multi energy forms, multilevel architecture, demand side management and generalized storage.

Keywords:

Microgrids, renewable energy, storage, DSM, multi energy Introduction

E6B - 2

Compressed Natural Gas (CNG) Technology at Grati Power Plant

Retno Aita Diantari[a], Isworo Pujotomo[b]

Electrical Engineering Department
College of Engineering – PLN (Foundation for Education & Welfare PT. PLN (Persero)
Jakarta, Indonesia
[a]retno_aita@yahoo.co.id, [b]isworop@yahoo.com

Gas has great potential to be converted into electrical energy. Indonesia has natural gas reserves up to 50 years in the future, but the optimization of the gas to be converted into electricity is low and unable to compete with coal. Gas is converted into electricity has low electrical efficiency (25%), and the raw materials are more expensive than coal. Steam from a lot of wasted gas turbine, thus the need for utilizing exhaust gas results from gas turbine units. Combined cycle technology (Gas and Steam Power Plant) be a solution to improve the efficiency of electricity. Among other Thermal Units, Steam Power Plant (Combined Cycle Power Plant) has a high electrical efficiency (45%). Weakness of the current Gas and Steam Power Plant peak burden still using fuel oil. Compressed Natural Gas (CNG) Technology may be used to accommodate the gas with little land use. CNG gas stored in the circumstances of great pressure up to 250 bar, in contrast to gas directly converted into electricity in a power plant only 27 bar pressure. Stored in CNG gas used as a fuel to replace loadbearing peak. Lawyer System on CNG conversion as well as the power plant is generally only used compressed gas with greater pressure and a bit of land.

Keywords:

Fuel, Compressed Natural Gas, power plants, efficiency of electricity

E6B - 3

Dynamic Modeling of CPO Supply to Fulfill Biodiesel Demand in Indonesia

Fitriyanti Mayasari[1,a], Rinaldy Dalimi[2,b]

[1]*PhD Student of Electrical Engineering Department, Universitas Indonesia, Indonesia*
[2]*Professor of Electrical Engineering Department, Universitas Indonesia, Indonesia*
[a]*fitriyanti.mayasari41@ui.ac.id,* [b]*rinaldy@eng.ui.ac.id*

Biofuel is one of the best alternative solutions to fulfill the fuel demand, due to the increasing of energy needs and the limited reserve of fossil fuel. Biodiesel, a liquid biofuel and derived from biomass, is produced from vegetable oil, animal fat and other sources to replace diesel oil. Indonesia has been producing biodiesel from vegetable oil, such as Crude Palm Oil (CPO). Because most of Biodiesel feedstock is derived from plant, which is also utilized for human food, it will become a major problem for food security issue of the country. Furthermore, the feedstock production also has some threats regarding to the limitation of land use for feedstock cultivation and infinite export commodity due to high export demand and promising price. The research aims to assess the production of CPO as the Biodiesel feedstock in Indonesia with all related constraints and without threating the food security. Using Dynamic Modeling with Stella Software, the CPO production is modeled with influence variables and their correlations, such as feedstock demand for export, food and Biodiesel, feedstock consumption, land, productivity and policy regarding CPO production, Biodiesel demand and Diesel oil import.
The simulation results, that in the year 2019, CPO Production for energy will not be sufficient to fulfill the Biodiesel Demand, but if the reserve of CPO Supply is utilized for energy, there will be plenty biodiesel produced to meet the demand, without interfering the food security and export commodity. The Government should synchronize the distribution of CPO by making list of priority order (food, fuel, export) in order to attain food and energy security. If B30 mandate is being accelerated, CPO export commodity should be limited to maximum 74.7 % of CPO Production in order to meet this mandate. With this scenario, diesel oil import could be reduced about 1.7 – 1.8 million kL.

Keywords:

Feedstock Production, Food Security, Biodiesel demand, Dynamic Modeling, CPO Supply, Export Limitation, Energy Security.

Concept Development for Quantification of Integrated Energy Security

Adinda Franky Nelwan[1,2], Chairul Hudaya[1,a], Rinaldy Dalimi[1,b]

[1]*Electric Power and Energy Studies, Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Department of Electrical Engineering, Faculty of Engineering Sam Ratulangi University, Manado 95115, Indonesia*
[a]*c.hudaya@eng.ui.ac.id,* [b]*rinaldy@eng.ui.ac.id*

Energy security is one of the important factors for energy policy of the country. However, there are many concepts offered by the researchers on energy security, leading to such a diverse and complicated interpretation. Here we develop a novel concept which elaborates the global perspectives. It is realized through a deep evaluation on energy security evolution, followed by a philosophical study of the subject matter and sight of view of energy security, resulting in an integrated energy security theory. The concept is applied to quantify energy security of Indonesia. The operational concept is a set of measurement instruments consisting of 7 dimensions, 31 indicators and 97 sub-components using dynamic programming algorithm. The result of this study provides an approximated number reflecting the aggregate index of energy security

Keywords:

integrated energy security, dynamic programming, index of energy security, concept development

E6B - 5

A Study on Overvoltage Protection Using Various Surge Protective Devices in Telecommunication Building

Diah Permata, Henry B.H. Sitorus, Yoga Putra Prathama[a]

Dept. of Electrical Engineering
University of Lampung
Lampung, Indonesia
[a]*yogaputraprathama@students.unila.ac.id*

A telecommunication building such as Base Transceiver Station (BTS) is prone to the threat of lightning strokes. Effect of lightning stroke becomes more severe due to most of telecommunication equipment work at low voltage, which has a low insulation level. A lightning surge can enter the building either via direct stroke to the power line or to the telecommunication tower and indirect stroke. This paper discuss the design of the surge protection system to protect against transient and surges that enter the facility due to direct stroke to the telecommunication tower. An investigation of various Surge Protective Devices (SPD's) installed on low voltage line will be conducted using Matlab/Simulink program tool. In general, studies on surge protection of BTS use only Metal Oxide Varistor (MOV) as a surge protective device. This research used another type of SPD's, i.e. Gas Discharge Arrester (GDA). GDA can carry very high surge currents to the ground than MOV, but the residual waveform is slightly higher than MOV. The SPDs arrangement conducted in this research, i.e. a parallel connected between GDA and MOV, a GDA and a MOV only. GDA is modelled using a mathematical model based on physical parameters, and MOV is based on model of non-linear resistor. The result of the simulation shows that each surge protective devices could reduce the maximum voltage of voltage surge between phase and neutral to the value far lower than insulation level either for the equipment or the secondary side of distribution transformer.

Keywords:

Lightning, surge voltage, surge protective device, gas discharge arrester, metal oxide varistor, overvoltage protection

E6B - 6

Power System Stability Improvement Using Dynamic Gain Control AVR PSS

Wahyuni Martiningsih[a], M. Iman Santoso, Heri Haryanto, Inawati

Electrical Engineering Department
University of Sultan Ageng Tirtayasa
Cilegon, Indonesia
[a]*y_martiningsih@untirta.ac.id*

Stability of the system is very important, because it affects the stability of the quality of electrical energy. Many things can affect the stability of one of the dynamic loads that affect the dynamic stability, dynamic stability can be defined as the ability of the system to remain in sync after the first swing conditions (transient period) to again reach steady state conditions, said electric power in a stable condition when all variables the situation is stable, good bus voltage, angle rotor and the generator rotor rotational speed. In this paper will discuss the use of the gain AVR (automatic voltage regulator) PI and PSS (power system stabilizer) is expected after the installation of additional control devices in power system dynamic stability can be improved so that it remains stable despite the interruption or change in load. Furthermore, the electric power system simulation using Matlab 2008a program which proves that the installation of the power system stabilizer can dampen oscillations, in this case the PSS worked as controller of electric power or reactive power can be seen from the output only has no overshoot and no oscillation occurs with a maximum voltage value of 1.017 pu before the change of the load, and after being given a step change in load with input 25 kVA system can still dampen oscillations with maximum voltage output increased by 1.021 pu to output generator rotor speed and angle of less too influential.

Keywords:

power system stability, AVR, gain control, PSS, dynamic stability

E6B - 7

Grounding System Design Optimization on 275 KV Betung Substation Based on IEEE Standard 80-2000

Ishak Kasim[a], Nur Fitryah[b], Syamsir Abduh[c]

Electrical Engineering Department, Industrial Technology Faculty
Trisakti University
Jakarta, Indonesia
[a]*ishak@trisakti.ac.id,* [b]*fitryahnur@gmail.com,* [c]*syamsir@trisakti.ac.id*

The demand of electricity transmission toward regions for society, industrial and other needs are increasing hence, making electricity transmission and distribution increased as well. The increase in electricity transmission and distribution requires addition of Substation construction. Substation constructions are crucial for economic growth in Indonesia. This research aims to design two models of grounding system, to determine permissible touch voltages and permissible step voltages, and to simulate both designs using CYMGrd Software, whereby both designs were compared to obtain optimal grounding system at 275 KV Betung Substation. With touch voltages and step voltages values of 1387.97 V and 364.6 KV in first model, and touch voltages and step voltages of 1247.2 V and 112.39 V in second model, both model did not exceed permissible touch voltages of 1409.58 V and permissible step voltages of 5050.1 V. Final result of this research showed that second design model was more optimal compared with the first design model.

Keywords:

Substation, grounding system, CYMGrd software, touch voltage and step voltage, IEEE 80-2000 Standard

E6B - 8

Influence of Permanent Magnet and Slot Opening Width to Cogging Torque Reduction in PMSG using Anti-Notch and Cutting Edge Method

Herlina[1,2,a], Rudy Setiabudy[1], Amien Rahardjo[1]

[1]*Electrical Department, Engineering Faculty, Universitas Indonesia, Depok, Indonesia*
[2]*Electrical Department, Universitas Sriwijaya, Palembang, South Sumatera*
[a]*herlinawahab@unsri.ac.id*

Cogging torque and permanent magnet electric machines are difficult to separate. This torque always exist due to the interaction between the magnetic field generated by the permanent magnet against the stator slot. The method proposed for reducing cogging torque in this paper is the Half cylinder anti-notch method and combination with the cutting edge method. It is also investigate the effect of variations width of the stator slot opening and the variation width between the permanent magnets. The models simulated using 2-D FEMM 4.2 version. It is found that the cogging torque will be significantly reduced if the slot opening of the stator is equal to the anti-notch width, minimizing the the slot width between the permanent magnets can also reduce the cogging torque and smoother cogging torque ripple is smoother than the reference model, both model will reduce the surface area of the air gap. Moreover, the proposed models can be used to reduce the cogging torque, makes the rotation of the rotor more smoothly and can reduce friction on PMSG.

Keywords:

Cogging torque, Half-cylinder anti-notch, Stator slot opening width, width between PM, Cutting Edge.

E6B - 9

Simulation of I-131 Dispersion around KNS (Kawasan Nuklir Serpong) using Gaussian Plume Model

Ratnasari Nur Rohmah[1,a], Nurokhim[2,b]

[1]*Teknik Elektro, Universitas Muhammadiyah Surakarta (UMS), Surakarta, Indonesia*
[2]*Pusat Teknologi Keselamatan dan Metrologi Radiasi, Badan Tenaga Nuklir Nasional (BATAN), Jakarta, Indonesia*
[a]*Rnr217@ums.ac.id,* [b]*nurokhim@batan.go.id*

There are many software-based tools that can be used to evaluate the radio-ecological impacts. Plume Gaussian is a simple dispersion model, easy to be implemented, and to be developed further. This paper describes the application of Plume Gaussian model to simulate the dispersion of I-131 released around the Kawasan Nuklir Serpong (KNS). The software development consists: mathematical models derivation and software implementation. The simulation performance is analyzed by comparing the simulation result with the real measurement data from some locations monitoring around the stack. The designed model was tested by using the real data of I-131 released from exhaust stack of PT.INUKI in KSN. Research result shows that Plume Gaussian model has the good opportunity to be used for evaluation of radiation impact to the environment. However, the model designed and the programs built needs to be further developed in order to achieve more accurate results in radiation monitoring. The result shows that the more complete of meteorological data the more accurate the modeling result. Using meteorological data 2012 -2013, test result of improved modeling designed shown that radioisotope production tends to lead between the north and northwest from the stack, around the KIM LIPI office.

Keywords:

Simulation, Gaussian Plume Model, I-131distribution

Design and Simulation of an Output Voltage Controller for Solar Power (PV) Application using Fuzzy Logic Controller

Wahidin Wahab

Department of Electrical Engineering,
Faculty of Engineering, Universitas Indonesia
Depok 16424, Indonesia
Wahidin.wahab@ui.ac.id

The solar (PV) energy as one of the renewable natural energy has been widely used as an environtment friendly resources, however the intensity of incoming sun-light as the source of the power, is not always the same all the time during the day, which makes the output voltage becomes unstable. The sun light intensity can be influenced by various factors such as the cloudy or sunny weather, which causes large changes in the generated voltage of the solar panels. To compensate for the variation of generated voltage when the light intensity is low, it should be boosted, and when the light intensity is high, it should be bucked and controlled to reach the required output voltage. And furthermore, the output voltage should be maintained to a desired DC voltage to be applicable for electrical households. A Fuzzy Logic controller is designed to control the duty cycle of a PWM signal generated to control the switching periode to regulate the output voltage of the system.

This paper discusses the design and control of a buck-boost converter for solar panels of the power range 50-100W, which can be used in household apparatus. The system has been analyzed, and validated by simulation study and the results show that the target voltage can be regulated very well.

Keywords:

Solar Energy, buck-boost, fuzzy logic control, voltage control, low power

Machine to Machine Application As KWh Meter Controlling

Gunawan Wibisono[1,a], Euis Suryati[2,b]

[1]*Department of Electrical Engineering, Universitas Indonesia,*
Kampus Baru UI, Depok 16424, Indonesia
[2]*Faculty of Computer Engineering, Diploma Institut Pertanian Bogor, Indonesia*
[a]*gunawan@eng.ui.ac.id*, [b]*mayhoneys@gmail.com*

At the moment, PT. PLN (PLN) as national electricity company have to visit customer place to disconnect or switch off (permanent break) the KWh meter if the customer did not pay the billing on time. It is important to design of a system that could automatically disconnect both temporary and permanent to electricity that flow to customer when the bill is not paid by customer when deadline is overdue. In this research, M2M as KWh meter controlling system will be designed and evaluated its performance. The proposed system is designed to minimize the time for breaking and improve PLN services. The proposed system consists of KWh meter, actuator and sensor, communication devices and application. The command to actuator to disconnect or switch off (permanent break) is based on the billing status of the customer at deadline of payment period. If the customer didn't pay the billing until deadline at the second month, the electricity will be disconnected to customer KWh meter, while the KWh meter will be permanent broke (switched off) if the customer didn't pay the billing until the deadline of the third months. It is shown from the tested results, that the proposed KWh meter is working properly. It is also shown from the tested results of the KWh meter controlling that the response time to device to disconnect or switch off is shorter than the time response SMS notification that sent to the customer.

Keywords:

PLN, M2M, KWh meter, disconnect, permanent break

Performance Comparison of Vertical and Horizontal Axis Wind Turbines to Get Optimum Power Output

Jazuli Fadil[1,2,a], Soedibyo[1], Mochamad Ashari[1]

[1]*Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
[2]*Department of Electrical Engineering, Politeknik Negeri Banjarmasin, Banjarmasin, Indonesia*
[a]*fadil16@mhs.ee.its.ac.id*

This paper presents the comparison of power captured by vertical and horizontal axis wind turbine (VAWT and HAWT) through optimizing aerodynamic performance to get optimum power. The aerodynamic improvement for the wind turbine using linear radial profile of the blade chord and twist angle has affected the mechanical power output of wind turbines. The linearization of chord and twist angle performed at 75% radial station while the twist angle radial profile is exponential profile. The optimized blade design used the linearization method successfully increased the coefficient power (CP). According to Betz, the limit of maximum CP is 0.59. In this case CP is important parameter that determines the power extracted by wind turbine. The model of linearized wind turbine has been tested to various wind velocity so that it affects the performance. We have found that CP of HAWT is 0.54 with captured maximum power is 1363.6 Watt while the CP of VAWT is 0.34 with captured maximum power is 505.69 Watt. The power extracted of both wind turbines seems that HAWT power is much better than VAWT power.

Keywords:

Wind turbines, Vertical Axis, Horizontal Axis, power

E6C - 4

Novel Derivative Cluster Area Methods (DCAM) for Power Optimization of PV Farm Under Dinamically Shading Effect

Antonious Rajagukguk[1,2,a], Ciptian Weried Priananda[1], Dedet Candra Riawan[1], Soedibyo[1], Mochamad Ashari[1]

[1]*Departement of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
[2]*Departement of Electrical Engineering, Universitas Riau, Pekanbaru, Indonesia*
[a]*antoniusrajagukguk@gmail.com*

Optimization method has been provided for optimizing output power of PV Farm under shaded. So far, many methods approaching the output power of PV Farm by tracking the Maximum Power Point (MPP) of PV farm using P-V curve. The previous methods having complex problem when multiple of MPP is exist in P-V curve when PV farm under partially shaded condition. To overcome these problems so in this paper offers a new method in order to optimize the power output of PV farm for normal and under shaded condition. The new method was named Derivative Cluster Area Methods (DCAM). The method works by doing a comprehensive approach in areas (wide) of the current and voltage characteristic on I vs V curve of PV Farm. In addition to a comprehensive approach in this research area is also combined with a mechanism based on the cluster corresponding voltage levels on each string of PV Farm at normal and under shaded condition. The area where that was obtained by integrating the functions of the current Characteristic curve I vs. V has a large equivalent to the maximum of the power generated by the PV Farm. So that the total area of the mechanism of some cluster is the total power generated by the PV power plant Farm Under normal conditions or under shaded. The conclusion from this study showed that the power generated in a PV farm was increased when compared to the conventional method.

Keywords:

PV Farm, Power Optimization. DACM, MPPT Algorithm, Area Cluster, Shaded Condition

E6C - 5

Principal component analysis and cluster analysis for development of electrical system

Iswan[a], Iwa Garniwa[b]

Electrical Engineering Department
Universitas Indonesia
Depok, Indonesia
[a]*is.one.wan@gmail.com*, [b]*garniwa@gmail.com*

This paper proposes an approach for development of electrical system. The proposed approach is combination of principal component analysis (PCA) and cluster analysis. This research based on relevant data of total population, gross domestic regional product (GDRP), GDRP of industry, GDRP of bussines, electric power each customer and energy used for each sector. This development profile is set up to show the condition of electrical system of each region, that will be used to support policy development electrical system of spatial development in the future. This paper consider 24 region in South Sulawesi province as development center points and use principal component analysis (PCA) to asses the regional profile for development. Cluster analysis is used to group these region into clusters according to the new variable produced PCA. The general planning of electrical system of South Sulawesi province can provide support for policy making of electrical system development. The future will include add on research several variables.

Keywords:

principal component analysis, cluster analysis, electrical system, development, spatial

E6C - 6

New Approach of Maximum Power Point Tracking for Static Miniature Photovoltaic Farm Under Partially Shaded Condition Based on New Cluster Topology

Ciptian Weried Prianandа[1,a,b], Antonious Rajagukguk[1,2], Dedet Candra Riawan[1], Soedibyo[1], Mochamad Ashari[1]

[1]*Departement of Electrical Engineering, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia*
[2]*Departement of Electrical Engineering, Universitas Riau, Pekanbaru, Indonesia*
[a]*ciptian.junior@gmail.com* , [b]*ciptian.prianandа13@mhs.ee.its.ac.id*

Photovoltaic is one of the electrical energy generating devices that potential for the future. In a large photovoltaic system, Photovoltaic Farm (PV Farm), there some issues that makes the operation less optimal. One of the problems is the shadow covering on the part of the area of PV Farm named Partially Shaded Condition. In topologies with single converter, partially shaded condition make the characteristic curve of the PV Farm have some multiple Maximum Power Point (MPP). This paper review the new approaches to harvest PV Farm by utilize multiple converter topologies for each cluster of local MPP. The total power generated by PV Farm is the sum of local MPP's values in each cluster of converter topologies. Hopely that the total power generated will be greater when compared with the use of MPPT algorithm on only single converter topologies. The use of Modified Peturb and Observe (PnO) Algorithm and Firefly Algorithm for MPPT not only proposed to increase the power harvested from PV Farm but also to reduce the impact of oscillations around the MPP power when the dutycyle is reaching steady state. This paper also comparing the performance of proposed method with Firefly Algorithm and PNO Modified algorithm for single converter topologies.

Keywords:

Photovoltaic, miniature PV Farm, smart clustering method, MPPT, Firefly Algorithm, Modified PnO Algorithm

E6C - 7

External Quantum Efficiency Measurement of Solar Cells

Wisnu Ananda

Electronic and EMC Laboratory
Center for Material and Technical Product (B4T), Ministry of Industry
Bandung, West Java, Indonesia, 40135
ananda@kemenperin.go.id

External Quantum Efficiency (EQE) measurement is one important method that is implemented to observe solar cells' behaviour in a specific range of wavelength. This research measured EQE in different type of solar cells: silicon, dyesensitised solar cell (DSSC), and perovskite solar cell. The objectives of this research are to understand the correct EQE measurement method and to understand the factors that affect EQE result on the three type of measured solar cells. Dedicated illuminator, monochromator, and lock-in amplifier, as the main equipments, were used in the experiments. The method used was the latest version of the standard for doing EQE measurement, which is ASTM E1021-15. The spectral responsivity (SR) has to be measured first before calculating the EQE value. This value was then validated using current density value obtained from current-voltage measurement. As a result, the silicon has the highest EQE among them all, but it is the perovskite which has the same profile with standard solar irradiance spectrum. It means that perovskite solar cell has the potency to maximise the utilisation of solar irradiance. Some critical points of measurements had also been identified during research. First is the providing of the testing vacuum chamber to minimise the influence of the environment. Second is the importance of regular calibration of the reference photodetector. Third is the illuminated area of reference photodetector. Fourth is the nonlinearity of SR versus light intensity in the DSSC.

Keywords:

External Quantum Efficiency (EQE), ASTME1021-15, silicon, dye-sensitised solar cell (DSSC), perovskite

Study of Filter-Bank Multi Carrier (FBMC) Utilizing Mirabbasi-Martin Filter for 5G System

Gregorius Ivan Baskara[a], Muhammad Suryanegara[b]

Department of Electrical Engineering, Faculty of Engineering,
Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia
[a]ivanbaskara25@yahoo.com, [b]suryanegara@gmail.com

5G air interface system is expected to provide an efficient usage of system resources and available spectrum. Higher main-lobe and lower side-lobe power are keys to achieve its efficiency. Filter Bank Multi-Carrier (FBMC) has been actively investigated for years and capable to enhance current system. This paper aims to study and to simulate the spectrum performance of FBMC utilizing Mirabbasi-Martin filter with a variation of overlap factor g = 3, 4, 5, 6. The results are comparing between the bandwidth, main-lobe power and sidelobe power of FBMC and OFDM. The FBMC g=4 is giving the most optimum performance because it performs higher main lobe power at a comparable OFDM bandwidth. Subsequently, we conduct computational simulation in the practical case of mobile network operator working at 945 Mhz – 952.5 MHz. The results have indicated a significant bandwidth efficiency and lower sidelobe power outside the spectrum band allocation.

Keywords:

5G, FBMC, OFDM, Mirabbasi-Martin, Spectrum Efficiency

E6D - 2

User's Velocity-based Uplink Power Control in 5G Femtocell Networks

Abdul Hafid Paronda[a], Muhamad Asvial[b]

Electrical Engineering Department,
Universitas Indonesia, UI
Depok 16424, Indonesia,
[a]abdul.hafid61@ui.ac.id, [b]asvial@eng.ui.ac.id

The number of subscribers and cellular traffic demand had grown dramatically, which is an urgent challenge face on the cellular network and system performance. Due to the problem, power allocation was exploited by many researchers in order to improve the system performance, e.g. implementation of fractional power control (FPC) as the power constraint in single carrier – frequency division multiple access (SC-FDMA) in term of uplink resource allocation algorithm and fractional power coefficient as the uplink control in heterogeneous small cell networks. Both of them could enhance any system performance i.e. spectral efficiency, transmission rate and energy efficiency. Even though any tradeoff would be the handicap in order to maintain the system's quality of service (QoS), such as the lower fairness index at the first one, worse outage probability and also significant interference at the second. In this paper, a dynamic uplink power control algorithm is proposed to solve the problem, especially to manage that tradeoff within user's velocity-based scenario (UVS). Beside to enhance the system performance improvement, the implementation of the proposed algorithm is also addressed as the way to investigate the 5G wireless technology, especially in a femtocell network. Numerical results as shown by this proposed indicate the obtained enhancement of the system i.e. improvement of the energy efficiency by 10% - 99%.

Keywords:

uplink power control, fractional power coefficient, energy efficiency, femtocell network, 5G technology

Efficient Implementation of Hash Sequence Authentication Based on RFID

Andreyanto Pratama[a], Taufik Hidyatullah[b], Dedy Septono Catur Putranto[c]

Sekolah Tinggi Sandi Negara
National Crypto Institute
Bogor, West Java, Indonesia
[a]*andreypratama12@gmail.com,* [b]*taufik.dayat21@gmail.com,* [c]*dedy.septono@stsn-nci.ac.id*

Security for accessing an area need to be noticed. Access restriction can be applied using authentication such as password. Thereby, the strong password is required, but it is hard to remember. Strong password can be generated by using hash function and stored on smart card can be solution. Smart card can be used as access card. Nevertheless, vulnerabilities of the card need to be noticed. Lamport's scheme as hash sequence authentication can be implemented to create dynamic access card which replicate resistant. Hash sequence authentication used to authenticate the prover. The prover should give hash value as input that has result equal with the verifier has. This scheme will be implemented using Arduino Mega ADK. The result of this research is a login hardware prototype.

Keywords:

Lamport, authentication, hash function, arduino, rfid

E6D - 4

Stationary Obstacle Detection Using Pyramidal Lucas Kanade Optical Flow

Sukra Bambang Wahyu Tri Hatmaja[a], Saptadi Nugroho[b], and Iwan Setyawan[c]

Faculty of Electronic and Computer Engineering
Satya Wacana Christian University
Salatiga, Indonesia
[a]sukra.bambang@gmail.com, [b]saptadi_nugroho@yahoo.com, and [c]iwan.setyawan@ieee.org

The obstacle detection system could be performed using Pyramidal Lucas Kanade Optical Flow calculation. The calculation is using greyscale images obtained from a camera or video files as input. The results from optical flow calculation then processed into Time to Contact (TTC) value that is used to estimate the distance of the robot to the obstacle. This paper proposed an idea to combine Pyramidal Lucas Kanade Optical Flow, the Region of Interest and Time History properties which can be used to detect an obstacle. The system can display the direction indicator as a response to avoid an obstacle. The results indicate that the system can detect the textured stationary obstacle in environments with light intensity between 22 lx and 400 lx. The average of total execution time required by the system for each frame to be processed is 31 ms.

Keywords:

Obstacle Detection, Optical Flow, Pyramidal Lucas Kanade, Region of Interest, Time History

E6D - 5

Downlink Power Control for Interference Management in Femtocell-Macrocell Cellular Communication Network

Misfa Susanto[a], Dika Fauzia, Melvi, Syaiful Alam

Electrical Engineering Department, University of Lampung, Jl Prof. Sumantri Brojonegoro No 1, Bandar Lampung 35145, Indonesia

[a]misfa@eng.unila.ac.id

Deployment of femtocell in macrocell cellular network which forms two-tier femtocell-macrocell cellular network faces more complicated interference problems, since it uses the same licensed frequency spectrum as its macrocell. This paper addresses the interference problems for downlink transmission in such two-tier cellular communication network. In this paper, interference management using power control is proposed in that two-tier network. This paper considers multicell cellular network composing of three macrocell systems. Ten femtocells are deployed in each macrocell system. This paper takes worst case for the scenario that is all femtocells and macrocells in downlink transmissions. Simulation for the system without power control was carried out first as a baseline system. Then, two methods of power control called as PC-1 and PC-2 in this paper were explored to reduce the interference effects. The use of two power controls is to take a trade-off, the increasing of quality of service (QoS) in macrocell system while is not degrading much QoS in femtocell system. Both power control methods are based on the estimated Signal to Interference Plus Noise Ratio (SINR). Both of power control methods also ensure that the results of controlled transmitting power will not exceed the maximum or the minimum of allowable transmitting powers. Simulations have been carried out and performance parameter in term of Cumulative Distribution Function (CDF) of SINR have been collected for co-tier (femtocell-femtocell and macrocellmacrocell), cross-tier (femtocell-macrocell and macrocellfemtocell), and the total interferences. The simulation results show that both power control methods outperform the baseline system.

Keywords:

Cellular Communication Network, Femtocell, TwoTier Cellular Network, Downlink Transmission, Interference Management,Power Control, Multi-Cell Scenario, SINR

The Adoption of TV White Space Technology as a Rural Telecommunication Solution in Indonesia

Lessy Sutiyono Aji[a], Dadang Gunawan[b], Gunawan Wibisono[c]

Department of Electrical Engineering
Universitas Indonesia
Depok City, Indonesia
Email: {[a]lessy.sutiyono61, [b]guna, [c]gunawan}@eng.ui.ac.id

The complex problems in the rural area caused the gap in telecommunication infrastructure between urban and rural areas so that technological solution that fit with the rural characteristics are required. Based on the literature, we argue that TV White Space is an appropriate technology alternative for rural conditions. The FCC and ECC have issued standards on the utilization of white space frequencies for secondary purposes that may be adopted by other countries. However, the challenges for developing countries like Indonesia are certainly different from those in developed countries. In this study, we do a preliminary simulation to find out under what conditions the FCC model encounters constraints on its implementation. The performance of the FCC model will decrease as the number of TV transmitters increase. Otherwise, by looking at the condition of Indonesia, some location have more than one TV transmitter. Based on simulations, we found the potential method to improve the performance of the FCC model to be applied in the overwhelming areas by the TV transmitters.

Keywords:

Rural area, TV White Space, FCC, ECC

E6D - 7

A Hybrid C/Ku-band High Throughput Satellite Systems As an Optimal Design for Indonesia

Dani Indra Widjanarko[a], Dadang Gunawan

Department Electrical Enginering, Universitas Indonesia, Depok-Indonesia
Email:[a] dani.indra@ui.ac.id

The internet and data traffic in Indonesia is still expected to grow. As an archipelagic country this will be a demand for satellite broadband. Next generation satellite system needs to have both higher throughput and availability, whilst trying to reduce the cost per Mbps. To fulfill the demands and performance, a multi beam satellite system has to be implemented over the coverage area, combined with the selection of appropriate operating frequencies and configurations. The most manufactured High Throughput Satellite (HTS) are dominated by Ka-band and several systems provided with Kuband solutions. All of these systems use straight configuration such as Kasat [3] and Viasat or combination of Ka-Ku band for example IPStar.

In Indonesia, as one of tropical countries, working on high frequency has to deal with propagation issue caused by rain attenuation. In order to keep the performance of the link, it is necessary to employ appropriate modulation and coding technique, as well as frequency selection. This paper presents the advantage of using C-band system without diversity station on the gateway site and the use of Ku-band spot beam on the user site, the combination of which will offer better performance and more economics than straight configuration ones. The system will be made by using Ku-band on the user site and a combination of C and Ku-band on the gateway site to improve the performance compared to a existing available HTS systems.

This study has a significant impact for existing FSS operators: (1) Existing Ku-band user will enjoy the benefit of prodigious improvements in performance when this C/Ku-band HTS becomes available. (2) FSS operators in Indonesia do not need to install costly Ka or Ku gateway diversity. (3) FSS Operators and users will have an assurance to deploy in their network today with no worry of facing difficulties in upgrading their system.

Keywords:

High Throughput Satellite, C/Ku-band, Indonesia

E6D - 8

Regulatory Recommendations for IoT Smarthealth care services by using Privacy Impact Assessment (PIA)

Insan Laksana Pribadi[a], Muhammad Suryanegara[b]

Graduate Program of Management of Telecommunications
Department of Electrical Engineering
Universitas Indonesia
[a]insanlaksanapribadi@gmail.com, [b]suryanegara@gmail.com

This paper aims to propose regulatory recommendations for IoT smart-health care service, by using the method of Privacy Impact Assessment (PIA). We utilize data from a relevant IoT smart-health care project in Indonesia. On structuring the final regulatory recommendations, we have conducted in-depth interview to the stake holders of Indonesian IoT smart-health care service. The results show that there are 5 aspects that need to be set in the proposed regulations, i.e. security compliance, device security, secure communications, virtualization security, and application security. In each of that aspect, we have built specific recommendation to ensure IoT service provider giving the best service without decreasing comfort of private information protection.

Keywords:

IoT, Privacy, Security, Smarth-health, Regulation

E6D - 9

Identification and Characterization of Mangrove Forest in View of Sustainability Conservation and Management: Mangrove Identification of Southern Coast Malang Region, East Java, Indonesia

Erfan Rohadi[a], Aida Sartimbul[b], Imam Fahrur Rozi[c]

[a,c]*The State Polytechnic of Malang, Jl. Soekarno Hatta No. 9, Malang 65141, Indonesia*
[b]*University of Brawijaya, Faculty of Fisheries and Marine Science, Jl. Veteran No. 16, Malang 65145, Indonesia*

The characteristic of Southern of Java coast area is typically rocky beach (rocky shore). Its characteristics which are connected directly to the Indian Ocean may affect the ecosystem of flora and fauna therein. The mangrove performs diverse functions and service on an ecosystem and landscape scale. The important factors for sustainable coastal management are the both economical values and ecological management as the association functions. Furthermore, the typical of tropical marine ecology is a chain as a triangular pattern that means each associated with one another such as the coral reefs, the seagrass and mangrove. Those may have distinct characteristics in the ecosystem. The mangrove in the Southern coast region of Malang grows scattered with various kind of interesting to do data collection based on the characteristics of mangrove found in Southeast Asia. This work is a collaboration between The State Polytechnic of Malang with The Faculty of Fisheries and Marine Sciences of University of Brawijaya which attempt to provide helpful information and integrative condition of mangrove ecosystems in Southern coast of Malang Region. The information contains in the form of the identification of species, mangrove biodiversity of the 18 beaches. The research methods of this study based on data processing of satellite image ALOS (AVNIR-2) and Landsat 7. The software ENVI 4.4 and Arc GIS 9.3 are used for data processing. The identification of various mangrove species using methods of in situ and laboratory observations. However, the satellite datum must be processed with in situ data so that it provides the informative map with some density classification. The results show that the recent mangrove vegetation (forest) condition in Southern Malang Region is recommended as a prior conservation for sustainability coastal management system. This work also provides the mangrove iBook format and e-book. The hard copy is obliged to the library flora Malang Regency as a supporting information for Southern Malang Region management system and as the academic learning process reference for high school students and universities students.

Keywords:

Mangrove, Coastal Management, Southern Malang, ALOS, Ecosystem, e-book

QiR

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International Conference in Saving Energy in Refrigeration And Air Conditioning (ICSERA 2017)

ICSERA

Studies of the Water Adsorption on Lampung's Natural Zeolite of Indonesia for Cooling Application

Dyah Arum Wulandari[1,2]*, Nasruddin[3], Lemington[4], R Z Wang [4]

[1,3]*Department of Mechanical Engineering, Universitas Indonesia,*
Kampus Baru UI, Depok 16424, Indonesia
[2,3]*Department of Mechanical Engineering, Universitas Negeri Jakarta,*
jl. Rawamangun Muka, Jakarta Timur 13220, Indonesia
[4]*Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University,*
800 Dongchuan Road, Shanghai, 200240, P.R. China

Part of minerals that originally formed from volcanic rock and ash layers reacting further with alkaline groundwater is called natural zeolite, where its sources are not always available in all countries. Indonesia is located in the ring of fire which have a huge sources of zeolite, one of the area is Lampung, South Sumatra. Natural zeolite has been considered as one of potential heat adsorbent medium which can contribute to the energy consumption and reduce air pollution in the using of cooling application. The characteristic of this Lampung natural zeolite such as adsorption kinetics, adsorption water uptake, and adsorption capacity were test with ASAP 2020 system. Sorption kinetics by this experiment of zeolite samples were carried out in a constant temperature and humidity chamber. The chamber can supply constant air condition with deviations of ±0.5 ^{o}C for temperature and ±3% for relative humidity. The data based on rate of adsorption and the defined working condition was set as 20^{o}C and 70% RH. Pore volume is a significant parameter for determining the limitation of water uptake, which can describe the saturated condition of zeolite. Sorption isotherm models used to describe sorption phenomena are commonly deduced from the Polanyi potential theory were investigated. The water adsorption quantity increased with the increase of relative pressure. To sum up, this pure zeolite has a less heat and mass transfer performance so its need to be activated before using in cooling application to get their great potential and by being coated in a desiccant heat exchanger systems.

Keywords:

Adsorber, Adsorption Capacity, ASAP 2020, Cooling Application, Lampung's Natural Zeolite

Characteristics Air Flow in Room Chamber Test Refrigerator Household Energy Consumption with Inlet Flow Variation

Edy Susanto[1*], M. Idrus Alhamid[1], Nasruddin[1*], Budihardjo[1]

[1]*Departement of Mechanical Engineering, Universitas Indonesia, Kampus Baru UI, Depok 16424, Indonesia*

In this study, the 2-D modeling conducted to assess the effect placed the inlet on designing a test chamber room energy consumption of household refrigerators. Where the geometry room chamber is rectangular and approaching the enclosure conditions. Inlet varied over the side parallel to the outlet and compared to the inlet where the bottom is made. The purpose of this study was to determine and define the characteristics of the airflow in the room chamber using CFD simulation. CFD method is used to obtain flow characteristics in detail, in the form of vector flow velocity and temperature distribution inside the chamber room. The result found that the position of the inlet parallel to the outlet causes air flow cannot move freely to the side of the floor, even flow of air moves up toward the outlet. While by making the inlet is below, the air can move freely from the bottom up to the side of the chamber room wall as well as to help uniform flow.

Keywords:

Characteristics Flow, Room Chamber, Inlet Flow, Refrigerator Household

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ICSERA2 - 3

Experimental Study on Thermal Performance of Refrigerants in Microchannel Heat Exchanger for Air-Conditioning Application

Ardiyansyah Yatim[1*], Muhammad Idrus Alhamid[1], Budihardjo[1], Dicky Alamsyah[1], Hotdian Sinambela[1]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia*

This paper describes: experimental comparison in thermal performance (COP) as the effect of the use of high ODP refrigerants and zero ODP and GWP refrigerants; and pressure drop of the microchannel heat exchanger, in air-conditioning applications. It is found that the maximum COP of 1.88 achieved when charged with R22 of 300 g with cooling capacity of 1.1 kW. The maximum COP of 1.92 achieved when charged with R290 of 300g with cooling capacity of 1.5 kW. When apply with any refrigerant, the refrigerant pressure drop in the microchannel heat exchanger remains at around 5.0 bars.

Keywords:

COP, GWP, Microchannel Heat Exchanger, ODP

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ICSERA2 - 4

Investigation of Flow Boiling Heat Transfer Coefficient of R410A in Various Minichannel Multiport Tubes

Nguyen-Ba Chien[1,a], Pham Quang Vu[1], Kwang-Il Choi[2], Jong-Taek Oh[2,b*], Honggi Cho[3]

[1]*Graduate School, Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea*
[2]*Department of Refrigeration and Air Conditioning Engineering,*
Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea
[3]*Advanced R&D Team, Digital Appliances,*
Samsung Electronics, 129 Samsung-ro, Yeongtong-gu, Suwon, 16677, South Korea
[a]*bachien@ejnu.net* , [b]*ohjt@chonnam.ac.kr*

This study demonstrates the two-phase heat transfer coefficient of R410A during evaporation in the aluminum multiport mini channels with the hydraulic diameter of 1.16 mm (7 parallel channels – Type A), 1.14 mm (11 parallel channels – Type B) and 1.07 mm (16 parallel channels – Type D). The experimental data were measured in the following conditions: the mass fluxes ranged from 50-150 kg/m2s, the heat fluxes of 3-6 kW/m2 and the saturation temperature of 6℃. The effect of mass flux and heat flux on heat transfer coefficient were analyzed. The experimental data were also compared with some well-known heat transfer coefficient correlations.

Keywords:

Heat Transfer Coefficient, R-410A, Multiport Minichannel, Correlation

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ICSERA2 - 5

Economic and Environmental Analysis Depending on the Concentration of Al_2O_3 Nanofluid U-Tube Solar Collector

Woobin Kang[1], Yunchan Shin[1], Honghyun Cho[2*]

[1]*Department of Mechanical Engineering,*
Graduate school of Chosun University, 303 Pilmun-daero, Dong-gu, Gwangju 501-759, Korea
[2]*Department of Mechanical Engineering, 303 Pilmun-daero, Dong-gu, Gwangju 501-759, Korea*

In this study, the efficiency of the U-tube solar collector as a function of the concentration of Al_2O_3 nanofluid was experimentally investigated. Besides, the efficiency of U-tube solar collector using the Al_2O_3 nanofluid as the working fluid was compared with that using water. The economic analysis in consideration of performance improvement was carried out using experimental result. As a result, the maximum efficiency of solar collector was 61.6% for using the water, and it was 72.4% for 1.0vol%-Al_2O_3 nanofluid which was the highest one. In the case of using 50 solar collectors, it is possible to save the 1117.87 kg coal usage for one year. It means the reduction of CO_2 and SO_2 generation is 2,940 kg and 9.5 kg, respectively, and it can be reduced more than 9,099 kWh in Gwangju. Germany shows the largest electric cost saving and it is $3,064.11 for one year. Besides, the electric cost in the Italy, Japan, United States, Canada, and South Korea can be saved by $2878.41, $2599.85, $1671.33, $1207.07, and $1160.65, respectively, at the same case. These findings contribute to knowledge of solar energy technology, which has the potential to reduce electricity and energy consumption world-wide.

Keywords:

Solar Collector, Nanofluid, Thermal Efficiency, Thermal Conductivity, Al_2O_3 (Aluminum Oxide)

ICSERA2 - 6

A New Method Using Effect Thermal Conductivity for a Full Thermal Storage Tank

Jae Dong Chung[1], Min Ho Kim[1], Yong Tae Lee[1]

[1]*Sejong University, 209 Neungdong-ro, Gwangjin-gu, Seoul 05006, Korea*

This study numerically carried out a research on a latent heat thermal energy storage system (LTES) filled with phase change material (PCM). In the previous works, one capsule which was arbitrarily positioned in the tank, was selected and this capsule was usually assumed to represent the performance of the whole LTES. A few of researches have been conducted for a whole domain of LTES because a tremendous computer memory and CPU time are required. This study introduces an effective thermal conductivity method to overcome the difficulties involved with phase changing problem. A previous method using the effective thermal conductivity ignored timewise variation of the strength of the natural convection in molten PCM. Conversely, the present method increases the accuracy of the model by including the effect of temporal variation of the natural convection in molten PCM.

Keywords:

Latent Thermal Energy Storage, Phase Change Material (PCM), Effective Thermal Conductivity

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ICSERA2 - 7

Investigation of Optimal Design of Flow Header in Heat Exchangers

Nguyen-Ba Chien[1,a], Jong-Taek Oh[2,b*]

[1]*Graduate School, Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea*
[2]*Department of Refrigeration and Air Conditioning Engineering,*
Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea
[a]*bachien@ejnu.net* , [b]*ohjt@chonnam.ac.kr*

In this study, we investigate an automated procedure to optimization the distribution of flow in manifolds by coupling the computational fluid dynamics (CFD) simulation and a genetic algorithm (GA). The design point is performed by balancing the liquid phase flow rate at each outlet, and the controlled parameter is the high of baffle between each channel. The simulation of flow distribution of R134a in manifolds has been demonstrated by using a VOF model. The flow pattern of R134a with various flow rates and inlet qualities are well observed. The objective of this study is to overcome the difficulty of experimental test at high quality due to the unstable of the flow. In addition, using this methodology, a set of results which would improve the distribution of flow is finally proposed.

Keywords:

CFD, Genetic Algorithm, Maldistribution, Header, Optimization, Open FOAM

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ICSERA2 - 8

Pressure Drop During Condensation of R410A Inside Horizontal Multiport Mini-channels Rectangular Tubes

PHAM Quang Vu[1,a], Kwang-Il CHOI[2], Jonng-Taek OH[2,b*], Honggi CHO[3]

[1]*Graduate School, Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea*
[2]*Department of Refrigeration and Air Conditioning Engineering,*
Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea
[3]*Advanced R&D Team, Digital Appliances,*
Samsung Electronics, 129 Samsung-ro, Yeongtong-gu, Suwon, 16677, South Korea
[a]*phamquangvu911273@gmail.com* , [b]*ohjt@chonnam.ac.kr*

In this research work, a new developing two-phase frictional pressure drop correlation during condensation processing based on experimental data has been presented. The frictional pressure drop of R410A experimental data points of two types multiport mini-channels, having 8 channels with a 1.16 mm hydraulic diameter and 11 channels with 1.14 mm hydraulic diameter. The test sections were designed as a counter-flow tube in a tube exchanger. The experiment is performed with mass fluxes of 50-400 kg/m2s and 3-12kW/m2 of heat fluxes, and saturation temperature of 480C. The frictional pressure gradient increased with increasing of mass flux and vapor quality but insignificant effect on with heat flux. The results showed that the new model can predict the two phase pressure drop during condensation and comparison between experimental data with some well known correlations.

Keywords:

Condensation, Pressure Drop, R410A, Correlation, Multiport Mini-channel

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ICSERA2 - 9

Experimental Study of Condensation Heat Transfer of R410A, R32 and R22 Inside a Micro-fin Copper Tube

PHAM Quang Vu[1,a], Kwang-Il CHOI[2], Jonng-Taek OH[2,b*], Honggi CHO[3]

[1]*Graduate School, Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea*
[2]*Department of Refrigeration and Air Conditioning Engineering,*
Chonnam National University, 50 Daehak-ro, Yeosu, Chonnam 59626, South Korea
[3]*Advanced R&D Team, Digital Appliances,*
Samsung Electronics, 129 Samsung-ro, Yeongtong-gu, Suwon, 16677, South Korea
[a]*phamquangvu911273@gmail.com* , [b]*ohjt@chonnam.ac.kr*

Two-phase flow condensation heat transfer characteristics of R410A, R32, and R22 inside a straight micro-fin tube with the outside diameter of 7mm were investigated experimentally. This study was especially focused on the influence of heat transfer area on the condensation heat transfer coefficient. The test section was a double tube of counter-flow type; the refrigerant was flowed condensation inside the test tube by heat exchange with cooling water flowing in the annular side. The temperature and pressure of refrigerant were measured at the inlet and outlet of the test section, and the surface temperature of tubes was measured. The pressure drop in the test section was directly measured by a differential pressure transducer. The heat transfer coefficient and frictional pressure gradient were calculated using the experimental data. The heat transfer coefficient was measured at the saturation temperature of 48°C within mass fluxes of 50-380 kg/(m2s) and heat fluxes of 3-12 kW/m2. The experiment results were compared with the existing heat transfer coefficient correlations, and a new correlation was developed with good prediction.

Keywords:

Condensation, Heat Transfer Coefficient, Micro-fin, Correlation, R410A, R32, R22

Multi-objective Optimization and Implementation of Double Stage Absorption Absorption System to Improve Kamojang 5 GPP's Performance

Agung Satrio Wibowo[1] and Nasruddin[1,a*]

[1] *Departemen Teknik Mesin, Fakultas Teknik, Universitas Indonesia, UI Kampus Depok, 16324, Indonesia*
[a] *nasruddin@eng.ui.ac.id*

This study focusses on implementation of double stage absorption to improve performance of Kamojang 5 GPP's. Heat recovery used for optimization, utilized from abandoned well that still have high thermal energy. There are several optimization conducted in this study, there are exergetic efficiency, annual cost, and multi-objective optimization. Calculations are conducted by using MATLAB, and optimtool function. The present operational condition on Kamojang has exergetic efficiency 42.4%. The combine system give positive result in therm of power output. Exergetic optimization of integrated system double effect absorption and power plant has 52.66 exergetic efficiency and system cost $3558400. Economic optimization has exergetic efficiency 44.3% and system cost $251400. While, multiobjective optimization has exergetic efficiency 51.9% and system cost $2913700 with optimum parameters; throttle vale pressure of 782.64 kPa, temperatur delta of cooling water 3.12^{o}C, evaporator temperature 7.6^{o}C, desorber temperature 120.08^{o}C, condenser temperature 44.9^{o}C, and absorber temperature 43.79^{o}C.

Keywords:

Double Stage Absorption, Economic Efficiency, Exergy, Exergetic Efficiency, Multiobjective Optimization

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ICSERA3 - 2

Level of Effectiveness of Risk-Based Inspection Program by Using the Semi-Quantitative API 581 Method on Geothermal Power Plants (GPPs) in Indonesia

Yodi S.[1], Nasruddin[1,a*], and Nanang K.[1]

[1] *Deparment of Mechanical Engineering, Universitas Indonesia, Indonesia and Pertamina Geothermal Energi, Indonesia*
[a] *nasruddin@eng.ui.ac.id*

Geothermal energy has an important role in the transition toward a low-carbon energy and environmentally safe. Geothermal energy is a renewable energy source that can be a solution to meet domestic energy supply. But, some Geothermal Power Plant (GPPs) also have various reliability challenges of failure of the equipment, which is specifically caused by the fluid content. Various methods for eliminating or reducing the risk of failure are a consideration as an effort to build an inspection program. Risk-Based Inspection (RBI) provides a link between the damage mechanism and the inspection program used to reduce the risk. The Risk Based Inspection (RBI) guidelines by the American Petroleum Institute (API) 581 Semi-Quantitative is one of the guidelines for implementation of Risk Based Inspection program. By studying the types of damage mechanisms that occur on the GPPS in Indonesia, This paper presented a case study on how effective the implementation of Risk-Based Inspection program by using API 581 Semi-Quantitative on the GPPs in Indonesia.

Keywords: -

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ICSERA3 - 3

Comparison Critical Analysis among FMEA, FMEA Fuzzy Logic, and FMEA TOPSIS on Geothermal Steam Turbine System

Yodi S.[1], Nasruddin[1,a*], and Nanang K.[1]

[1] *Deparment of Mechanical Engineering, Universitas Indonesia, Indonesia and Pertamina Geothermal Energi, Indonesia*
[a] *nasruddin@eng.ui.ac.id*

The Increasing complexity of Geothermal Power Plants (GPPs) installations and operations, along with growing public awareness to ensure higher levels of reliability, has put great pressure on the designers and operators to find innovative solutions to ensure reliability as well as economically viable operation. Critical Analysis becomes a major task for analyzing appropriate maintenance strategies for every equipment to increase reliability, especially in Geothermal Steam Turbine System. FMEA is one of the tools to prioritize equipment based on their failure modes. FMEA is a calculation from severity, occurrence, and detection. The results of this factor is RPN (Risk Priority Number). The use of RPN is to compare the criticality risk among Geothermal Steam Turbine System. However, the combination of severity, occurrence, and detection may yield the exact same RPN value despite significant differences in their risk implications. This problem occurs because the relative importance among severity, occurrence, and detection is not taken into account. The use of fuzzy logic approach and TOPSIS (The Technique for Ordering Preference by Similarity Ideal Solution) would make the relative importance of severity, occurrence, and detection are considered. The comparison of RPN value among FMEA, FMEA fuzzy logic, and FMEA TOPSIS is used to know the advantages and the disadvantages of its application, in order to get the appropriate methods for critical analyze equipment in Geothermal Steam Turbine System.

Keywords: -

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ICSERA3 - 4

A Study on Optimization Design of Water-Cooled Heat Sink Plate for Inverter Cooling of Turbo Chiller

Kwang Pyo Lee[1], Byung Ryeon Kim[1], Chan Woo Park

[1]*Chonbuk National University, Jeonju Jeollabuk-do, South korea, 54896*

The purpose of this study is to apply cooling system of inverter used in turbo chiller to water cooled system. The existing air-cooled cooling system has a disadvantage in that it has a large volume that affects the heatsink depending on the usage environment. In this study, we have studied a water-cooled inverter cooling system to overcome these disadvantages. ANSYS CFX16.1 was used to optimize the cooling system. The inlet temperature of the cooling water was 30 ° C and the turbulence model of the cooling water flow was the k-epsilon model. Experimental conditions were as follows: inlet temperature of cooling water was 30 ℃, and heat input was 300, 500, 800, 1500W. An optimized water - cooled water box was directly machined using a CNC machine tool and the experimental data and CFX analysis data were compared.

Keywords:

Air-cooled Cooling System, Water-cooled Cooling System, Optimize, Analysis

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ICSERA3 - 5

Simulation Study on the Estimation of Energy Consumption of Refrigerated Container

Muhammad Arif Budiyanto [1,a*], Nasruddin[1], Fariz Zhafari[2]

[1]*Department of Mechanical Engineering, Universitas Indonesia, Indonesia*
[2] *Undergraduate Student at Department of Mechanical Engineering, Universitas Indonesia*
[a]*arif@eng.ui.ac.id*

Refrigerated containers account for half of the total electricity consumption by storage yards and that this is expected to increase continuously each year. A refrigerated container is a special cargo container equipped with an integral refrigeration unit. The amount of power consumption of the refrigerated container will change depending on many external variables. Environmental factors mainly solar radiation received on the container walls caused surface temperatures increase will then affect the power consumption. This paper provides a simulation study on the estimation of energy consumption of refrigerated container. The simulation model performed on the building-design energy analysis used Integrated Environmental Solution (IES) software packages. The geometry of simulation model considers the actual dimension of refrigerated container consists of insulation walls in the three-dimensional analysis. Physical properties of the insulation walls and environmental factors used weather data are applied to the simulation model as parameter inputs. Estimation of energy consumption of the model based on the calculation of cooling load from the object considers the thermal effect from the sun energy. The measurement data from the experimentation was conducted by Shinoda and Budiyanto (2016) used as validation of simulation model. The comparison of energy consumption from simulation and measurement shows in shows in good agreement.

Keywords:

Refrigerated Container, Energy Simulation, Energy Consumption, Energy Analysis, Environmental Factors

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International Conference on Dwelling Form (I-DWELL)

I-Dwell

From Negotiating Identity to Claiming Space: An Outlook on Socio-political Dynamics of Community Mosques in Malang, East Java

Yulia Eka Putrie[1,3,a], Widjaja Martokusumo[2]

[1]*Student of Doctoral Program, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung (ITB), Indonesia,*
[2]*Department of Architecture, School of Architecture, Planning, and Policy Development, Institut Teknologi Bandung (ITB), Indonesia*
[3]*Department of Architecture, Faculty of Science and Technology, UIN Maulana Malik Ibrahim Malang, Indonesia*
[a]*ekaputrie.yulia@gmail.com*

Mosque architecture in Indonesia is inseparable from the socio-political context of various Islamic groups or organizations, such as Nahdlatul Ulama, Muhammadiyah, PERSIS, AlIrsyad, etc. Mosque is considered as an important institution in developing and educating the majority of Indonesian Muslim society. Many mosques were built by Muslim communities which had culturally been affiliated to one of the groups or organizations. Therefore, their mosque architecture can be considered as one means of expression of their specific identity or their particular perspective on the ideal picture of a mosque. However, there is also another condition where mosques were built by heterogeneous Muslim community. In this context, the image of an ideal mosque brought by the community members of each Islamic group then became the object of negotiation, where each element related to the mosque was negotiated by the members of various Islamic groups. This paper discusses to what extent these negotiations were resulted in the architecture of the negotiated mosques. The research is located in Malang, East Java, where the dynamic interactions among various Islamic groups take place. This study reveals that the negotiation process can lead to space claim with the negotiated elements of identity, as the result of the domination on the activity system or the physical control over the mosque.

Keywords:

Community Mosque, Identity, Islamic Groups, Malang, Negotiation

I-Dwell1A - 2

The Visual Aesthetic of Landscape in Semarang

Prof. Ir. Edy Darmawan, M.Eng.[1], Dr. Ir. Suzanna Ratih Sari, MM., MA.[1], Adhisti Samsinar Enis, A.Md. [1]

[1]*Architecture Department, Engineering Faculty, Diponegoro University, Semarang, Central Java, Indonesia*

The visual aesthetic of landscape in Semarang is determined by the lifely of the landscape, the category of the park: active and passive, aesthetic hardware and software the landscape. In addition, the visual aesthetic can be identified from the landscape of street and square. The researchers use qualitative identification method. The researchers determine the qualification of landscape in Semarang. Based on the analysis of the elements of the parks, it can be concluded that the aesthetic of landscape in Semarang has high visual value. Finally, the result of this study can be used as the reference in making the map of aesthetic landscape in Semarang. The landscape would be developed to become aesthetic visual.

Keywords:

Visual Aesthetic, Landscape, Semarang City

I-Dwell1A - 3

Choreographing Flow and Pause: Inhabiting Transitional Space

Enira Arvanda[1], Amy K. Marku[1*]

[1]*Universitas Indonesia, Depok 16424, Indonesia*

Pedestrian underpass is a transit space commonly found in urban space. As the name suggests, it is a structure that enables the act of passing through underground tunnel. Architecturally, this type of space is typically utilitarian, straightforward and only serves the act of walking from one point to another within the city. For its users, underpass is just a vessel that contain and direct their movements, a space without further meaning that no one could really related to. Thus, it fits perfectly with Marc Auge's description of 'non place'. Furthermore, user's detachment from this space and its spatial characteristics could trigger anxieties.

This paper suggests that pedestrian underpass has more potentials rather than just being a channel for mobility. As walking is an embodied act, if one's body could engage with its environment, in result, meaningful relationship between the body and the space could be formed. Bodies could temporarily inhabit space through events produced in-between/while moving from one destination to another. Thus, the idea of stasis in space of movements need to be explored, it is to find balance between act of walking (flow) and act of momentary stopping (pause). The dynamics of flow and pause within the pedestrian underpass will enable users to engage with the space, hence, changing it from non-place to place. Case study for this paper is an underpass in Kota Tua, Jakarta, which applied crossprogramming, mixing utilitarian with commercial use. In result, the writer found that flow and pause in transitional space need to be choreographed carefully and accordingly. Various public uses can be integrated within its spatial program, along with careful planning of interior architectural elements, which consider behavioral, ergonomic and psychological aspects of its users. This will result underground passage as a 'habitable' place.

Keywords:

Movements, Transit Space, Pedestrian Underpass, Interior Architecture

I-Dwell1A - 4

Evaluation of Dome House Design Against the Local Context on Post-Earthquake Housing Relocation at Dusun Ngelepen, Yogyakarta, Indonesia

Herry Santosa[1,a*], Dandi Raviandaru P. [1], M.Satya Adhitama[1]

[1]*Architecture Department, Faculty of Engineering, Brawijaya University, Jl. MT.Haryono 167 Malang-65145, Indonesia*
[a]*herrysantosa@ub.ac.id*

Dome House is a model of a house built on post-earthquake housing relocation, one of which was built at Dusun Ngelepen, Yogyakarta. Dome house developed by WANGO (World Association of Non-Governmental Organization), a Non-Governmental Organization in the United States. Dusun Ngelepen severely damaged by the earthquake in 2006, so it needs to be relocated at the new location. In September 2016, residents of the Dusun Ngelepen received assistance from NGOs WANGO cooperating with DFTW (Domes for the World). The dome house construction was completed in April 2007. At first, the Dome House was designed with the basic house concept, which could later be developed. The dome house built on a land area of 2.8 ha, consisting of 71 housing units divided into 5 blocks. Currently, the Dome house has undergone many changes in the shape of the building and additional room. This study aimed to evaluate changes in the Dome House design and its suitability to the local context of local communities. The method used is field survey and observation accompanied by questionnaires and interview method. The results stated that 79% of Dome House experience change in building shape and additional room. Until now, the changes in the Dome House occurred during six periods from 2007 to 2016. The biggest change at home Dome occurred in 2009 which amounted to 69%. The biggest factor affecting changes of Dome House are economic factors and local climate. Types of materials and construction forms of the Dome House perceived it difficult for the community to be developed according to the local material as well as knowledge communities. Ultimately, this study stated that the Dome House design is less able to adapt to the local climate and the technological knowledge of local communities so that people have difficulty in carrying out houses improvement.

Keywords:

Dome House, Design Evaluation, Building Form, Building's Appearance, Yogyakarta

Handheld Pulse Oximeter Based on Single Board Computer Raspberry Pi B +

Ernia Susana[1,a] and Hendrana Tjahjadi[2,b]

[1]*Department of Electromedic Engineering Politeknik Kesehatan Kemenkes Jakarta II Jakarta, Indonesia*
[2]*Department of Electrical Engineering Universitas Indonesia Depok, Indonesia*
[a]*erniayg@gmail.com,* [b]*hendrana.tjahjadi61@ui.ac.id*

Self-monitoring enables patients to become more active participants in their health care, home pulse oximetry can provide objective data for determining health status and the possible need for medical consultation or interventions. Pulse oximetry is a non-invasive and continuous method for monitoring the blood oxygen saturation level. Pulse oximetry has gained acceptance in the medical community caused low costs and easy to operation. Prototype pulse oximeter in previous research still use system based on microcontroller. Microcontroller system is ideal for building robotic systems but microcontroller system has a weakness in terms of processing the signal. During the last decade, development of single board computer has provided smaller, faster and more affordable. The aim of this study to develop a prototype handheld oxygen saturation based on singleboard computer Raspberry Pi for home care. The added value of this research is using the single board computer system and the graphical user interfaces were designed to become more informative. This study uses experimental research with a quantitative approach. The results of this study successfully developed a prototype pulse oximeter equipped by LCD touch screen that can display the value of oxygen saturation (SpO2), pulse rate (PR) and photoplethysmography (PPG). The reliability of oxygen saturation and heart rate were quite stable from ±1% to ±2% compare gold standard, with standard deviation range of 0.577 to 1.

Keywords:

Pulse Oxymetry, Raspberry Pi, SpO2, Qt, Pulse Rate, Photoplethysmography

The Concept of Sustainable Prefab Modular Housing Made of Natural Fiber Reinforced Polymer (NFRP)

Erni Setyowati[1*], Edward E Pandelaki[1]

[1]*Architecture Department, Engineering Faculty, Diponegoro University, Jl. Prof. Soedarto, SH, Semarang, 50275*

Public housing in Indonesia is a very important issue in the development of infrastructure. Housing need factor and the design concepts are the government's focus in this problem, so that the society can feel its benefits. The concept of public housing that became the focus of research is the concept of the upstream to the downstream that can foster sustainable local industries and building the nation character through increased and diversified micro industrial products. This research aims to formulate the concept of public housing based on research results on natural fiber reinforced polymer (FRP) material which has been done in the road map of research. Research output is the public housing design and specifications of FRP made of water hyacinths and coconut fiber. Method used is descriptive review of the concept based on references and material test which consists of density, water absorption, modulus of rupture (MOR), tensile strength, absorption coefficient and Sound Transmission Loss (STL). The entire test of material were carried out in the laboratory of materials and construction, while the acoustic tests carried out using the impedance tubes method. The test results concluded that the FRP material may have a density between 0.2481 – 0.2777 g/cm3, the absorption coefficient is average of 0.450 – 0.900, the Modulus of Elasticity is between 4061 – 15193 kg/cm2, while the average of sound transmission loss is 52 – 59 dB. Furthermore, that the concept of public housing must be able to be the embryo of the concept of environment-friendly and low emissions housing.

Keywords:

Public Housing, Sustainable Materials, Natural Fiber

I-Dwell1B - 3

Enhancement of the Green Environment to Support the Use of Natural Materials in Traditional Housing

Indri L Juwono[1]

[1]*Departemen Arsitektur, Universitas Indonesia, Depok, Indonesia*

Was the use of a natural roofing material and lifecycle assessment of a good environment can be achieved by increasing public awareness to build a green environment around the settlement? Traditional housing that had been aged for many years ago has been using material from the forests surrounding environment are deliberately planted and maintained to keep the life cycle of existing homes in the settlement. But along with the modern development, forests and gardens turned into agricultural land or road, so the replacement material decreased when the material used rotted and need to be replaced but the resulting price of the material will be expensive. Some years ago, in Wae Rebo village, Flores traditional homes Mbaru Niang has not full existed and replaced by zinc roof houses around the settlement. However, the current re-built traditional houses by taking building materials from the surrounding forest that has now become the forest industry, but through a variety of licensing process. Some raw material such as reeds now is imported from Mules island that is to the south of the island of Flores. If part of the material could be planted around the settlement, material procurement will not be hard and far. The method of this research started with the study of traditional settlement building and the threat of extinction due to reduced green surroundings and the behavior of people, as well as the understanding of the life cycle of buildings and its function on the environment. Field studies need to be done to obtain primary data on the condition of the natural environment, material distance, local climate data, material characteristics and compare the roof of reeds and zinc as replaced materials. Awareness of the community to rebuild the traditional settlement could increase awareness to keep the environment to create the settlement life cycle of nature in the surrounding areas, where building materials come from nature and can be returned to nature when rotted. Maintaining a traditional building improved the comfort of the occupants to a positive impact on the environment is increasing soil quality for land cover wider areas.

Keywords:

Natural Materials, Traditional Housing, Wae Rebo

I-Dwell1B - 4

Thermal Effectiveness of Wall Indoor Fountain in Warm Humid Climate

Jackobus Ade Prasetya Seputra[1]

[1]*University of Atma Jaya Yogyakarta, Jl. Babarsari 44, Yogyakarta, 55281, Indonesia*

Currently, commercial and residential buildings employ water features such as waterfalls, fountains, and water curtains to increase their aesthetical value. Consequently, both humidity and temperature of surrounding air will be inversely affected, i.e. the air humidity increase whereas its temperature decrease. Therefore, until recently there are no specific research has been conducted to measure water feature's effect upon thermal condition in built environment as mentioned above. Furthermore, it is believed that Indonesia's warm humid climatic condition ascribed by high humidity and relatively low wind speed will negatively affect its evaporative cooling potential. According to that, this research examines the influence of evaporative cooling occurred on indoor wall fountain as a representative of common water feature toward occupant's thermal comfort. In order to achieve this goal, research employs a case study conducted inside Waroeng Steak Restaurant's dining room in Nusukan, Surakarta. Quantitative approach is implemented by utilizing computer simulation software Computational Fluid Dynamics (CFD) as a tool to analyze the data and produce conclusions. Research variables developed are; water feature's height, number of obstructions of falling water, and types of indoor fans installed. They are simultaneously simulated to predict the thermal effect might occur in the calculation domain in terms of air temperature and humidity as the main indicator of indoor thermal comfort. Criterion used is SNI 03-6572-2001 which states comfort range of 20.5–27.1oC and 40-60% relative humidity. As result, Full 2 Bumps Model is better than Full 3 Bumps Model when employs natural ventilation inside the room. In contrary, if examined room was mechanically ventilated by fans, Full 3 Bumps Model surpass the other models in creating the best thermal condition. Moreover, the application of adaptive ventilation rate is required to maintain thermal balance inside the room.

Keywords:

Computational Fluid Dynamics, Evaporative Cooling, Indoor Water Fountain, Room Ventilation, Thermal Comfort

The Design Transformation of Public Housing Units with Short Period Occupancy

Silfia Mona Aryani[1]

[1]*Universitas Sebelas Maret, Jl. Ir. Sutami 36 A, Surakarta 57126, Indonesia*

In Indonesia, the initial house provided by the government is known as Rumah Inti Tumbuh (RIT) . The growing mentioned (referring to the word tumbuh in Indonesian) means that the unit is expected to transform according to the occupants financial improvement and spatial need development. This article is based on the second phase research that examines the design transformation of the initial house during occupancy. The first stage of the research observed the units of Condong Catur Public Housing in Yogyakarta Province that has been occupied since 1980s. The finding of the first stage research leads to the further research question on how the transformation tendency that would be created on newer public housing. This article is aimed at discussing the design transformation of public housing's unit that has been occupied for shorter period of time than the previous sample of observation. The research is conducted with qualitative method. It observes the occupants of Wonorejo Public Housing and the transformation they have made during occupancy in order to meet their spatial need. The observed unit has been occupied for less than five years by the time the reseach is conducted. The data is collected by observing the development of the unit, interviewing the occupants and gaining information from literature. The observation is focused on the zoning pattern, the priority of development direction and the room addition of the space programming. The research finds that the occupants tend to maintain the existing zoning and add the service space at the back of the house, prioritize its development and expand the kitchen area. Some of those findings eventually show similar tendency with the previous reseach. Therefore, this trend could be considered as predictive adjustment for initial design of RIT.

Keywords:

Initial House, RIT, Self-help Transformation, Wonorejo Public Housing

Bumi Awi Kabula Kabale: A Proposal to Alter the Fate of Mankind Through Adaptive Bamboo Structure

Anastasia Maurina[1,a,b*], Budianastas Prastyatama[1], Carissa[1], Altho Sagara[1], Sisi Nova Rizkiani[1], Buen Sian[1] , Jung Eun Shin[2]

[1]*Faculty of Engineering, Universitas Katolik Parahyangan, Ciumbuleuit 94, Bandung 40141, Indonesia*
[2]*JUBIT International, Jalan Hegarbudi, No. 2, Bandung 40141, Indonesia*
[a]*maurin@unpar.ac.id,* [b]*anastasia.maurina@gmail.com*

The urban expansion effects on the physical-spatial density of "new urban" areas, called urbanizing rural, which in its constructions mostly used the "urban" conventional materials. These materials usually have to be delivered from far distance, which can be immensely costly - economical, time, social cost, and also environmental cost. The building itself, as a dwelling physical space, is always limited to a certain size through a certain time-space context and have no tendency for adaptation. In fact, people will ceaselessly expand their lives through time, which bring about the complaint about the rigidity of their building, which become inadaptable to their evolving needs through time. At a certain time or the end of the intended time, that built object should constructively have altered, received subtraction, given addition, or demolished to allow the new object extended or new needs. The alteration will consume numerous building materials, which leads to even more cost. The exploitation of the massive building material, particularly the supporting structure of buildings (which stash approximately 60% of the environmental load of building materials) will be excessively impacted on the fate or sustainability of a built environment itself. The statement above allows us to set forth a question of [im] possibility: can man reverse, alter, and modify the path towards the demise of mankind through the very act of consumption itself? Can dwelling as the act to exist and as the constructed object provides the material means for the alteration? Creating an adaptive structure with a local resources, is an important point to alter the fate of mankind. This paper reports the experiment with the constructed object that allows dwelling to provide options for alteration of dwelling itself, through an adaptive bamboo structure, named 'Bumi Awi Kabula Kabale'. This structure has been proven to enable the dwelling's adaptation: available, extendible, flexible, refitable, movable and recyclable and enable to reduce material's consumption at the time of building's alteration. Ultimately, it could alter the fate of mankind and create human's dwelling, that is more harmonious balance between man and nature.

Keywords:

Dwelling, Adaptive Structure, Adaptability, Bamboo

Spatial Transformation Pattern Due to Commercial Activity in Kampong House

Bangun I.R. Harsritanto[1], Bintang N. Prabowo[1], Resza Riskiyanto[1], Arnis R Harani[1] and Mirza Ramandhika[1]

[1]*Architecture Departement of Diponegoro University*

Kampung houses are houses in kampung area of the city. Kampung House oftenly transformed into others use as urban dynamics. One of the transfomation is related to the commercial activities addition by the house owner. It make house with full private space become into mixused house with more public spaces or completely changed into full public commercial building. This study investigate the spatial transformation pattern of the kampung houses due to their commercial activities addition. Site observations, interviews and questionnaires were performed to study the spatial transformation. This study found that in kampung houses, the spatial transformation pattern was depend on type of commercial activities and owner perceptions, and there are several steps of the spatial transformation related the commercial activity addition.

Keywords:

Spatial Transformation Pattern, Commercial Activity, Owner Perception, Kampung House, Adaptability

I-Dwell2 - 4

I Dwell in [Im]possibility: Utopian Planning & Design in Indonesia as Bias Toward a City of One-dimensional Society

Triatno Yudo Harjoko[1]

[1]*Universitas Indonesia*

The dominant paradigm and the practice of urban planning and design in Indonesia has been overwhelmed with foreign idea, Western urbanism. Planners and designers deny the persistence of dual existence of society, that is of modern/ traditional, capitalist/bazaar. This paper will discourse the ambiguity of the [im]possibility of dwelling in the light of the duality of the society.

The research is based on theoretical discourse related to the idea of dwelling. The analysis of the study will focus on a single case study of private development of Kota Wisata that is planned as un-integrated the large development of housing area in the suburban Jakarta. The rest occupying densely urban kampung represent those of traditional or non-modern one. In many cases, new modern development may exist mutually exclusive as separate entities against the kampung settlement that has no connection with one to the other.

Findings have shown that Kota Wisata is an exemplary model of the city of one dimensional community. It denies the possibility of the low income, let alone the poor, to dwell and share urban facilities within.

Keywords:

Dwelling, Dual Society, Mono-dimensional Society

I Dwell in Fluid Space: Reading Smooth and Striated Space on Pasar Ciputat Tangerang

Eka Permanasari, PhD[1,a], Bonardo Tobing[2,b]

[1]*University of Pembangunan Jaya, Bintaro, 15413, Indonesia*
[2]*University of Pembangunan Jaya, Bintaro, 15413, Indonesia*
[a] *eka.permanasari02@gmail.com,* [b] *bonardo17@gmail.com@gmail.com*

Deleuze (1987) introduced the term striated and smooth space in several metaphoric ways. Both terms intermingle, "smooth space allows itself to be striated, and striated space re-imparts as a smooth space" (Deleuze, 1987: 486). Striated is seen as a fixed space, closed at one side and assigns breaks. It carries a sense of border. On the other hand, smooth space is seen as continuous and open interval. However, both terms are always intermingling, at one point smooth can be striated and vice versa. A city can be seen as a striated space and an ocean is a smooth space. However, at the same time the city can also be seen as smooth (urban sprawl, shanty town) and the ocean can be seen as striated as we see it on the map and lines of latitude and longitude (Deleuze, 1987: 476).

This research looks at the way in which people dwell in a fluid space. Space is a highly fluid in terms of its uses and occupation depending on its users. Looking at a strip near Pasar Ciputat, Tangerang Selatan, this paper investigates how the space changes function and identity overtime. The strip on the road of Pasar Ciputat becomes a good example of analyzing the smooth and striated space practiced in everyday life. This strip is heavily populated by street vendors who has 'occupying schedule' and continuously changes the patterns of occupation. They prefer to sell the goods on the road instead of in the provided building. By midnight, the strip is not accessible as the vendors closed off and sell their goods on the road. In the morning, some vendors disappear and their former space has been used by other vendors to sell different goods. The road is becoming accessible again. By noon, different vendors take over the space and sell different stuffs. Space becomes highly fluid where uses and meaning collapse together. Through observation, urban morphological mapping and photographic analysis, this paper will uncover the everyday uses of space and how the spaces become fluid following the different ways of its users.

Keywords:

Fluid Space, Pasar Ciputat, Smooth and Striated Space

The Floating Houses of Sintang City: Space, Resources and Political Nexus

Mira S. Lubis[1], Triatno Y. Harjoko[1], Dalhar Susanto[1]

[1]*Department of Architecture, Faculty of Engineering, UniversitasIndonesia, Kampus Baru UI, Depok 16424, Indonesia*

Sintang is a city in the interior of West Kalimantan with 365,000 inhabitants which located at the intersection of two large rivers, Sungai Kapuas and Sungai Melawi. Growing from the river's edge, the present Sintang still maintain their riverine culture in the form of floating houses ('rumah lanting'), as its legacy of the past, when rivers played an important role as main transportation routes for political and economic activities. This paper explores several concepts related to power, space, and resources, to examine the complexity of life of lanting dwellers, conducted at two location of lanting houses that spread in Sintang urban area: Sungai Durian and Pasar Inpres.

The results show that there are two main factors affecting the life as well as the spatiality of lanting dwellers. First, the relationship with river's ecology and river's behavior, and second, the linkages with the activities on the mainland, where both of them are strongly influenced by political and economic considerations. The impact of changes in the river's ecology and behavior on the lanting dwellers has shown how government policies affected the rivers and thus, the lanting communities.

The key contribution of this study is a detailed depiction of the political and power relations in the context of spatiality and resources on the riverine culture, especially the lanting communities along Kapuas and Melawi River in Sintang City, which tends to reveal the marginalization of the lanting community among the other urban community. So far, there have been no serious and detailed studies about the politics of space in relation to nature and resources and local livelihoods in the area. This paper wishes to explore the challenges to strive a livable and just place for community of the floating villages in the future.

Keywords:

Floating Houses, Sintang, Power, Space, Resources

The Crux of Minimalist Architecture: A Local Strategy of Housing Design in Jakarta or a Break Free from Traditions?

Yulia Nurliani Lukito[1], Bella Previta Handoko[1]

[1]*Universitas Indonesia, Depok 16424, Indonesia*

During the 1950s, the idea of minimalism presents itself as one of the response of the search of universal language in art and architecture. This particular style that started as an art movement has received so many critics as a loss of art but nevertheless it has spread all over the world and to many disciplines including architecture. In minimalist architecture, design elements attempts to convey simplicity, basic geometric forms, no decoration, white space, modern materials and clean spaces. The “less is more” movement in architecture, which is characterized by the works of Mies van der Rohe in International Style that celebrates materiality and rationality, is also understood as minimalism. Moreover, an important historical connection to minimalist architecture is the relationship to popular representations of how the upscale modern family lived. Recently, the idea of minimalist architecture appears in Indonesia as a preferable housing style. Adapting minimalist architecture to be suitable for a tropical region can be done partly by modifying the forms and the microclimate such as using passive system approach or additional equipment that makes possible for the building to create its own comfort. This paper investigates the idea of minimalist architecture in Indonesia and how the idea is widely used in housing design in Jakarta. Some questions related to this study are investigating whether minimalist architecture in Jakarta shares the same principles with minimalist architecture or it is only a trend in housing design. Not only this study analyzes the moment when the idea of minimalism develops in the history of modern architecture but also analyzes characteristics of minimalist architecture in different era and space. In addition, this study also discusses how minimalist architecture that happens in Jakarta becomes a way of dealing with both modern and local conditions, including a break free from traditions.

Keywords:

Minimalism, Minimalist Architecture, International Style, Modern Architecture

Material Studies as the Possible Channel to Re-connect

Budianastas Prastyatama[1,a,b*], Anastasia Maurina[1]

[1]*Lecturer & Researcher, Program Studi Arsitektur, Universitas Katolik Parahyangan, Jl. Ciumbuleuit 94, Bandung 40141*
[a]*mikail.budi@unpar.ac.id* , [b] *mikaelbp@gmail.com*

Discussing Emily Dickinson's sense of dwelling, one cannot help but being intrigued to relate it to Heidegger's proposition of dwelling. Whereas Dickinson's poem emphasize the vastness possibility of whatever way of life the poet chose had in offering (hence the decision to let her state of mind dwell in such way), this symposia essentially proposes dwelling in a Heideggerian sense of the word. The relation of both senses of the word plays important role to achieve in the realm of material dwelling what the level of possibilities offered in the sublime realm of the mind.

Heidegger proposed that dwelling itself is the evidence of human existence in the mortal world, and that "building is really dwelling" (Heidegger, 1951). It is mankind's very act of being, through cultivating things and constructing buildings. Furthermore, dwelling's fundamental character is to spare and to preserve [the primal fourfold: the oneness of mortals & divinities, earth & sky].

One argues that 'dwelling in [im]possibilities' truly asks a fundamental question of building as both an object and an act, constructed and done in the present time. It asks whether the current practice of building, and now the consumption of it, is truly dwelling or something else. It asks whether it is [im]possible that the act of building and the object building still retain the character and role of sparing, of preserving the primal fourfold of mankind's existence as mortals on earth?

This paper proposes a channel of possibilities to answers the questions through material studies, especially ones which provides insights and knowledge to the realm of [building] construction, since it is through materials that building as verb and noun is made possible to come into being, into existence, as [physical] things that signifies mankind. As mankind exists in things that he cultivates and builds, he cannot escape the material reality of the earth.

Material studies argue to provide the possibilities of delivering the conceptual dwelling, now separated from building, into communion with the physical realities of modern man, thus once again remarrying it to building. For through the work of one's narrow hands, one gathers the fourfold into material things, a mortal paradise on earth.

Keywords:

Dickinson's Dwelling, Heidegger's Dwelling, Building in the Present, Material Studies, Communion of Dwelling and Building

I-Dwell3 - 5

Phenomenology of the Development the Outside Area in the Densely Populated Housing's Settlement in Indonesia

Yanita Mila Ardiani[1] and Noegroho Noegroho[1]

[1]*Bina Nusantara University, KH Syahdan 9, Jakarta Barat Indonesia*

Densely populated settlements has its own uniqueness in the development of the spaces within and outside it. In Indonesia, especially in Jakarta, densely populated settlements are changing the behavior of occupants and shape to fit the needs of the space required. Houses densely populated in this section we will discuss the results of the survey to our research in the discussion analysis for residents in Indonesia. Densely populated settlements in Indonesia is influenced by cultural and economic guidance. Culture related to the social community. Nearly 80 percent of people living in densely populated villages, working in informal sectors. And the type of work they do odd jobs regardless of their nature, are usually the trade, being a realtor / broker, security guards or work in a shop near his home. These "needs" changes the face of each dwelling in the settlement. Every house adapts to the needed spaces. With increasing number of existing population, the need for increasing the space required in one house. In some ways this is in sharp contrast with the standardization of a healthy home, RTBL (structure plans for buildings and environments). There are 5 phenomenon that exists when a residential house in the densely populated undergoing expansion space, and that is often seen is on the porch. Being: The space works: "warung", Stairs, living together communities, and the shirt dry area. This fifth discussion is why it happens and the culture of living that affect it. The qualitative methods we use, by add some theory from the Architecture literature. The changing spaces in the building become our research to discuss the phenomenology the home space in densely populated settlements in Indonesia.

Keywords:

Phenomenology, Outside Area, Densely Population Settlement

Hierarchy of Home Forms Homey Feeling for Seniors (Case Study: X Senior Living, Wast Java)

Intan Chairunnisa[1]

[1]*Universitas Indonesia, Kampus UI Depok 16424, Indonesia*

Being old is the period where man has special needs because of the frailty of the body's functions, affecting the way to dwell. Senior Living facilities provide these needs of dwelling for elderly. Dwelling activities on senior living facilities can not be separated from the definitions of home as its standard definition and becomes an everyday and home as the fulfillment for seniors. Hierarchies of home consists of aspects that meet the standard needs of the common and the elderly. When these hierarchies of home which required certain requirements are met, the house which defined as a home can the state of homey feeling. This research aims to determine the extent to which Senior X Living fulfill aspects of home which give the notion of a homey feeling. The method is used for observational case studies based on the theory of hierarchy of home forms homey feeling for the elderly consist of six aspects: the home as a physical boundary, territory of private space and public space, the experience of space, accessibilities, and special objects that form the homey feeling. Based on the observations made, X Senior Living meets the criteria of 95% (74 out of 78 criterias) aspects of the home on a hierarchy that forms homey feeling for the elderly based on the theories. During the observation, I found that the fulfillment of homey feeling also affect the dwell time for the elderly.

Keywords:

Home, Homey, Dwelling, Seniors, Senior Living

Community Engagement and Children Spatial Needs in Rusun Kemayoran

Nevine Rafa Kusuma[1], Rossa Turpuk Gabe Simatupang[1] and Triatno Y. Harjoko[1]

[1]*Departement of Architecture, Faculty of Engineering, Universitas Indonesia 16424, Depok*

Human life-cycle space includes the necessary space, especially for the playing age stage. Playing is necessary in terms of human development in this stage. This will enhance both physical and psychological development of a child. We may argue that the lack of this in human being dwells will make them deprive of both physical and psychological development.

Children spatial needs such as a play space in multi-stories housing (rumah susun - Rusun) in many cases is usually neglected due to its limited space. In fact, playing is an essential aspect for children to develop their social competence and emotional maturity. Moreover, the cultural context in Kemayoran Multi-storey housing showed that parents' supervision has influence on the chosen site. In this regard, suitable space for playing in the vicinity of their home is necessary.

The objective of dwelling issue that raised by team of community engagement project of the department of architecture Universitas Indonesia is the possibility for children to have a decent and proper playing ground in their vicinity of the rusun. The site chosen for this project is Kemayoran multi-storeys housing (Rumah Susun Kemayoran). The program is focused on setting up an Educational Play Area or Ruang Bermain Edukatif (RBE). This program has been implemented with the involvement of local community. The project has succeeded to develop community participation for engaging and setting up an educational playing area immediate to their residence in rusun, in the ground floor area.

Keywords:

Rusun or Multi-storey Housing, Children Spatial Needs, Community Engagement

Translation of Rumah Ulu of South Sumatra into A Modern House

Yulia Nurliani Lukito[1] and Cika Kasturi Supria[1]

[1] *Dept. of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok 16424*

For people who *moved from* their village to a city, it is not easy to build a house following vernacular building like their house in the village. Vernacular buildings are built to support the needs and values of their inhabitants and provide instructive examples of sustainable solutions to building problems. Yet, these solutions are sometimes assumed to be inapplicable to modern buildings. If the design of a modern house is adapted from a vernacular house, there should be a translation of vernacular ideas. The translation makes the concept of modern house is not exactly the same as a traditional house, even though both of the houses have similar forms. This study investigates the use of vernacular ideas of *rumah* Ulu in South Sumatra into modern houses. The house forms of *rumah* Ulu, with tropically-suited roofs, elevated interior, and harmonious proportions are considered by some people to still have relevance. This study focuses on the translation of *rumah* Ulu including how the house forms and rooms such as *serambi* (verandah), living room, and bedrooms are changed by inhabitants. Some aspects of house forms and building designs of both the traditional and modern houses are explored through a qualitative method and field research in order to discuss the suitability of *rumah* Ulu to its inhabitants's needs.

Keywords:

Rumah Ulu, Translation in Architecture, Vernacular House

I-Dwell4 - 4

Co-residency among Migrants in Balikpapan Easy Kalimantan Indonesia

Wendy I. Hakim[1*]

[1]*Universitas Indonesia, Depok, Indonesia*

The background of this study is urban housing problem in Indonesia, which is still viewed solely from its physical aspect and the demand of it is mostly calculated quantitatively only. This view considers a house as physical entity only, excluding the variety of aspirations of its occupants. This is becoming a gap in the housing supply in Indonesia, in the terms of diversity in social, economy, and culture. This context has shaped various aspects of the society, including housing.

This research highlights co-residency phenomenon among migrants in Balikpapan, East Kalimantan, Indonesia. The idea of co-residency is a part of internal migration issue in Indonesia, in which the migrants will co-reside with their relatives at their city of destination. The aim of this study is to identify housing strategy of migrants in urban area and discover their housing aspiration in terms of affordability in economics and sociocultural aspect in this kind of housing. Grounded Research method is used due to the fact that co-residency is an existence reality – not an empirical object of architecture itself. Coresidency phenomenon contains the ideas of living in other people's house; hence this study focuses on the aspect of the presence of house occupants.

The co-residency of migrants can be seen as dwelling issue on a micro level – in a house – as well as on a macro level, that is city as a human settlement. For migrants, in one hand, co-residency with relatives at their city of destination is one of the available choices for housing besides renting and buying, which relating to what young-adult migrants can afford while still looking for a job and not yet earning any income. On the other hand, coresiding with relatives in a foreign city is an acceptable idea and way of living, which is practiced as a cultural matter that carries out certain values and traditions. Both sides of the co-residency phenomenon can be discussed as to how a dwelling process is becoming possible for migrants in their city of destination.

Keywords:

Co-residency, Dwelling, Housing, Migration

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MAT1A - 1

Feasibility Study of Chemical Treatments on *Sorghum Fibres* for Compatibility Enhancement in Polypropylene Composites

Ismojo[1], Ghiska Ramahdhita[1], Mochamad Chalid[1,a*]

[1]*Departement of Metallurgy and Materials Engineering, Faculty of Engineerring, Universitas Indonesia, West Java,Depok 16424, Indonesia*
[a]*chalid@metal.ui.ac.id*

Polypropylene (PP) is one of the biggest petro-polymers, which is used in very wide application nowadays. The environment problem due to materials such as plastics having very long time degradability, and critical petroleum sources have promoted some studies to empowerment of natural resources such as natural fibres for substituting or at least modifying petro-polymers. Because of biodegradability obtained from natural source, sorghum fibers are interesting to be used as filler in PP composites, despite of weak compatibility between them. Surface modification on the sorghum fibers through alkalinization prior to acetylation was aimed to improve the fiber compatibility to PP. The treatments were expected to substitute hydroxyl group in the sorghum fibers, into acetic ester group in order to increase their hydrophobicity as the fillers. Moreover, the treatments were able to unbundle single fibers into micro-fibrillated cellulose (MFC) fibres with increase in crystallinity index. Usage of this MFC fibers as filler in PP leads to improvement of the composite performances such as thermal properties. In this study, Fourier Transformation Infra-Red (FTIR) Spectroscopy, X-ray Diffraction (XRD), Differential Scanning Calorimetry (DSC) and Field-Emission Scanning Electron Microscope (FE-SEM) were used to evaluate the performances of the *Sorghum* fibers after the treatments and as the filler in the *Sorghum* fibers/PP composites. The experimental results showed the MFC fibers as the smallest sizes in 5.0 microns and the highest crystallinity index up to 79.1 %, obtained from alkalinization with 2.5 M NaOH prior to acetylation with 17.4 M CH_3COOH and the glacial $(CH_3CO_2)_2$. Compatibility study of the treated *Sorghum* fibers on PP shows an improvement indicated by a strong interaction between the fibers and PP on morphology observation, increase in melting point of PP from 163.4°C (using virgin *Shorgum* fibers) into 163.6°C (using treated *Shorgum* fibers) in DSC measurements.

Keywords:

Alkalization, Acetylation, Micro-Fibrillated Cellulose, Sorghum, Crystallinity, Compatibility, Melting Point, Polypropylene, Composit

MAT1A - 2

The Influence of Nano Filler on the Thermal and Mechanical Properties of Polypropylene

C. Budiyantoro[1]

[1]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Muhammadiyah Yogyakarta, Yogyakarta 55183, Indonesia*

In order to obtain specific properties in the commercial and engineering applications, PP materials are often combined with additives. Filler is one of solid additive type that made of inorganic materials and is generally distinguished by its influence on the mechanical properties of the resulting mixture with the plastic matrix. Filler dimension less than 100 nm is often categorized as a nano filler and added to plastics with the range of percentage from 1% up to 10%. Various studies have been conducted to know the influence of filler on mechanical properties, but this study is also conducted to investigate the effect of nanofillers on thermal properties of PP material. Thermal properties are very important to know from the stage of design, processing until the end use final product. Most plastic products are made in soft or liquid condition, the melting temperature (melting temperature, Tm) becomes the basis of the processing parameter adjustment. Investigations done by comparing the thermal properties of commercial copolymer PP material (virgin material and injection molding specimen) and PP materials containing nano filler (virgin material and injection molding specimen) by using Differential Scanning Calorimetry (DSC), while data of mechanical properties was obtained by the tensile test. Both 1st heating and 2nd heating DSC Experiment showed that nano filled PP need the highest endhothermic effect (2.63 W/g and 1.79 W/g), but nano filler gave no effect on melting temperature to all type of specimens (in the range of 164.3 – 166.3 8C). The elastic modulus of nano filled PP was around 1486 Mpa, higher than non filled PP (999 Mpa).

Keywords:

DSC, Mechanical Properties, Nanofiller, Polypropylene, Thermal Properties

MAT1A - 3

Characteristics of Nanofluids Made from Solgel Synthesized-Al2O3 Nanoparticles Using Citric Acid and PEG as Organic Agent and Bauxite as Raw Material

Dani Gustaman Syarif [1,a], Djoko H. Prajitno[1], Efrizon Umar[1]

[1]*Center for Applied Nuclear Science and Technology (PSTNT)-BATAN*
Jl. Tamansari 71, Bandung 40135, Indonesia
Telp. 62-22-2503997, Fax 62-22-2504081
[a]*danigus@batan.go.id*

Nanofluids have great attention in the world due to big potential to replace conventional fluids that have been used in some systems such as automotive, nuclear reactors, solar heating, building heating, and industry. Utilization of indigenous raw material in production of nanoparticles is a key to reach real application of the nanofluids. The aim of this study is to know the effect of combination of organic agent in solgel synthesis on characteristic of Al2O3 nanoparticles and nanofluids made of them. In this study, Al2O3 nanoparticles have been synthesized from local bauxite using solgel method with citric acid and PEG 4000 as chelating and capping agent. Nanofluids with pH 10 were prepared from the nanoparticles. Raw material of Al(OH)3 was extracted from the bauxite. Powder of Al(OH)3 was diluted in water, and citric acid and PEG 4000 was added into the solution to form a sol. The sol was heated to form a xerogel, and then calcined at 900oC for 3 hours to get the Al2O3 nanoparticles. From the synthesis we obtained gamma-Al2O3 nanoparticles with crystallite size of 5.00-5.63 nm. From the characterization data of the nanofluids it was known that the nanofluids with concentration of Al2O3 nanoparticles of 0.025 vol % to 0.1 vol% possessed relatively high zeta potential of -39.2 mV to -40 mV, and good critical heat flux (CHF) enhancement of 13% to 74%. The nanofluids had large potential to be applied as coolant for External Reactor Core Cooling System (ERVCS), ECCS (Emergency Core Cooling System), electronics, automotive, metal forming and solar heating system.

Keywords:

Nanofluids, Al2O3, Citric Acid, PEG, CHF

MAT1A - 4

The Investigation of the Melting Temperature Effect on the Rate of Solidification in Polymer Using Modified Phase-Field Model

Arbi Irsyad Fikri[1], Hanindito Haidar Satrio[1], Muhammad Joshua Y.B.[1], Mochamad Chalid[1], Jaka Fajar Fatriansyah[1,a]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Depok, Jawa Barat 16424*

[a] fajar@metal.ui.ac.id

Phase field model has been successfully constructed to simulate the behavior of semi-crystalline polymer solidification phenomenon. Actually, this model has been widely used and successfully utilized for simulating solidification phenomena in metals. However, non-conserved phase field equation can be extended to include the unique polymer parameters which do not exist in metals for example: polymer melt viscosity and diffusion coefficient. In order to extend this model, we incorporate free energy density and non-local free energy density based on Harrowel-Oxtoby and Gibbs-Landau theorem for polymer. By using expansion principle for higher order of binary phase field parameter, full modified phase field equation can be obtained. The solidification phenomenon in polymer is very important to optimize the final properties of the products. Here, we use our modified equation to investigate the effect of melting temperature on the rate of solidification. It was found that the rate of solidification is correlated with melting temperature in not straightforward manner.

Keywords:

Polymer, Solidification, Phase Field, Polymer Product

MAT1A - 5

Preparation of Anatase TiO_2 Nanoparticles Using Low Hydrothermal Temperature for Dye-Sensitized Solar Cell

Nofrijon Sofyan[1,2,*], Aga Ridhova[1], Akhmad Herman Yuwono[1,2], Arief Udhiarto[3]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

[2]*Tropical renewable Energy Center, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

[3]*Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

One device being developed as an alternative source of renewable energy by utilizing solar energy source is dye-sensitized solar cells (DSSC) that works using simple photosynthetic-electrochemical principle in the molecular level. In this device, the inorganic oxide semiconductors of titanium dioxide (TiO_2) has a great potential for the absorption of the photon energy from the solar, especially in the form of TiO_2 nanoparticle structure. This nanoparticle structure is expected to improve the performance of DSSC because the surface area to weight ratio of this nanostructures is very large. In this study, the synthesis of TiO_2 nanoparticle from its precursors has been performed along with the fabrication of the DSSC. Effort to improve the size of nanocrystalline anatase TiO_2 was completed by low hydrothermal treatment at various temperatures whereas the crystallinity of the anatase phase in the structure was performed by calcination process. Characterization of the materials was performed using X-ray Diffraction (XRD) and scanning electron microscope (SEM), while the DSSC performance was examined through a high precision current versus voltage (I-V) curve analyzer. The results showed that pure anatase TiO_2 nanoparticles can be obtained at low hydrothermal of 100, 125, and 150 °C followed by calcination at 450 °C. Photocurrent-voltage characteristic with the best performance was given by hydrothermally synthesized TiO_2 at 150 °C with power conversion efficiency (PCE) of 4.40%, whereas the standard TiO_2 nanoparticles has PCE only 4.02%. This result is very promising in terms low temperature and thus low cost of anatase TiO_2 semiconductor preparation for DSSC application.

Keywords:

Conversion Efficiency, Dye-Sensitized Solar Cell, Hydrothermal Method, TiO2 Nanoparticle

One Dimensional Inorganic Semiconductor Oxides Nanostructures derived from Wet-Chemistry Routes and Post-Hydrothermal Treatment

Akhmad Herman Yuwono[1,2,a*], Amalia Sholehah[3], Nofrijon Sofyan[1,2] , Latifa Hanum Lalasari[4]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering Universitas Indonesia, Indonesia*
[2]*Tropical Renewable Energy Center (TREC), Universitas Indonesia, Indonesia*
[3]*Department of Metallurgical Engineering, University of Sultan Ageng Tirtayasa, Indonesia*
[4]*Research Center for Metallurgy and Materials, Indonesian Institute of Science, Puspiptek Serpong, Indonesia*
[a]*ahyuwono@eng.ui.ac.id*

One-dimensional (1-D) nanostructures such as nanotubes, nanorods, nanowires have been considered as important materials for various strategic applications. In one of the devices, for example, dye sensitized solar cell (DSSC), those nanostructures can be integrated as semiconductor oxide layer to provide such ballistic effect for faster electron transfer. Among other processing techniques for preparing 1-D nanostructures, wet-chemistry routes are well-known as simple and cheap methods. Through low-temperature synthesis approach, this technique can achieve better control of growth or particle size and creates new morphologies or structures that may not be stable if synthesized at higher temperature. However, normally the resulting inorganic phase is rather amorphous, which limits its potentials for certain applications including DSSC. In the present work, we demonstrate the use of post-hydrothermal treatment in order to enhance the crystallinity and electronic properties of TiO2 nanotubes and ZnO nanorods derived from sol-gel and chemical bath deposition (CBD) processes. The high-pressure water vapor during the post-hydrothermal treatment functions to facilitate a more flexible inorganic phase rearrangement leading to crystallinity improvement. It was also shown that the use of additional pre-annealing step prior to post-hydrothermal treatment helps in maintaining the integrity of nanostructural morphology. Through the combined techniques, the band gap energy (Eg) of the resulting TiO_2 nanotubes and ZnO nanorods can be lowered down approaching their bulk value, i.e. 3.21 and 3.12 eV, respectively.

Keywords: -

MAT1B - 1

The Preparation of Activated Carbon from Coconut Shell Charcoal by Novel Mechano-Chemical Activation

Jaka Fajar Fatriansyah[1], Tryatmaja Matari[1], Sri Harjanto[1]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok, Jawa Barat 16424*

Activated carbon has been successfully prepared from coconut shell charcoal using novel dry mechano-chemical activation with KOH and planetary ball mill. The combination of chemical activation and mechanical activation on coconut shell charcoal is found to increase its micopore volume and surface size. These increase yielded to a high adsorption capacity which was measured at 298 K and 268 K found to be 0.6 wt. % for activated carbon. The adsorption experiments were conducted using constant-volume-variablepressure (CVVP) test. Adsorption parameters were calculated using adsorption isotherm models: Langmuir and Dubini-Asthakov models and were found in good agreement for type II adsorption phenomenon. It is also found that the adsorption capacity of activated carbon was suitable for hydrogen storage application.

Keywords:

Activated Carbon, Adsorption, Hydrogen Storage, Isotherm, Porosity

Fabrication of Solar Cells with TiO2 Nanoparticles Sensitized Using Natural Dye Extracted from Mangosteen Pericarps

Nofrijon Sofyan[1,2,*], Aga Ridhova[1], Akhmad Herman Yuwono[1,2], Arief Udhiarto[3]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Tropical Renewable Energy Center, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[3]*Department of Electrical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

With the increasingly shrinking reserves of fossil-based energy, as well as the damaging effects of the use of fossil-based energy sources such as the greenhouse effect and global warming, efforts are needed to find energy alternatives. One device being developed as an alternative source of renewable energy by utilizing solar energy source is dye-sensitized solar cells (DSSC) that works using simple photosynthetic-electrochemical principle in the molecular level. In this device, the inorganic oxide semiconductors such as TiO2 has a great potential for the absorption of the photon energy from the solar, especially in the form of TiO2 nanoparticle structure. In this study, a commercial TiO2 nanoparticle was used. The asreceived TiO2 nanoparticle was characterized using X-ray Diffraction (XRD) and scanning electron microscope (SEM). For sensitizer, natural dye extracted from mangosteen (Garcinia mangostana L.) pericarps was used. The extracted natural dye was characterized using Fourier transform infrared (FTIR) for the functional groups, whereas the ultra violet-visible (UV-Vis) was used to examined the absorption activity of the extracted natural dye. The performance of DSSC was analyzed through a precision current versus potential different (IV) curve analyzer. The maximum power conversion efficiency (PCE) of the mangosteen natural dye was given by yhe one extracted using ethanol containing 20% distilled water as compared to the commercial organic dye with PCE of 4.02%. This result is convincing and promising for the next development.

Keywords:

Anthocyanin, Dye-Sensitized Solar Cell, Hydrothermal Method, Mangosteen Pericarp, TiO2 Nanoparticle

MAT1B - 3

Improving the Efficiency of Perovskite SOLR Cell through the Addition of Compact Layer under the TiO2 Electron Transfer Material

Erlyta Septa Rosa[1], Natalita Maulani Nursam[1], Shobih[1], Rizky Abdillah[2]

[1]*Research Center for Electronics and Telecommunication, Indonesian Institute of Science (LIPI), Bandung, Indonesia.*
[2]*Physics Engineering, School of Electrical Engineering, Telkom University, Bandung Indonesia.*

Perovskite solar cell is emerging as a new type of photovoltaic technology, which may become a widespread low-cost technology in the future. The high efficiency achieved by the perovskite solar cells shows that this type of solar cell has the potential and prospect to be developed to approach the efficiency of silicon-based solar cells. Perovskite material is an organic/inorganic halides compound with ABX_3 structured, where A is an inorganic cation, B is a metal cation and X is an anion. The perovskite structure is capable of producing a low energy bandgap, so that it can be used as an absorber of sunlight. In the fabrication of perovskite solar cells, the perovskite layer is typically deposited onto the TiO_2 semiconductor layer. The TiO_2 layer serves as an electron transport material (ETM). In order to form the perovskite layer firmly and evenly, a structured mesoporous (MS) TiO_2 surface is required. A porous layer could also make the electrons move more quickly through the pores to reach the contact. However, the electron-hole recombination and electron trapping in the dead end pore are still occurred. One of the solutions to overcome this problem is to add a thin compact layer (CL)-TiO_2 under MS-TiO_2 layer. The CL-TiO_2 is expected as to prevent recombination and attract electrons trapped in the MS-TiO_2 layer. In this paper, we report the addition of a thin compact layer (CL)-TiO_2 under MS-TiO_2 layer in the fabrication of perovskite solar cells based on methyl ammonium lead iodide ($CH_3NH_3PbI_3$). The compact layer TiO_2 was grown under mesoporous TiO_2 layer by dipcoating in $TiCl_4$ solution. The time of the dip coating was varied to obtain an optimum efficiency improvement. The structure of the device is glass/FTO/CL-TiO_2/MSTiO_2/$CH_3NH_3PbI_3$/Spiro-OMeTAD/Ag/FTO/glass. It was concluded that the addition of CL-TiO_2 can improve the perovskite solar cells power conversion efficiencies. The best efficiency was obtained from the 15 minutes dip-coating, which corresponded to the thinnest CL-TiO_2 out of all samples. The electrical characterization performed under irradiation with an intensity of 50 mW/cm2 at 25 °C generated an open circuit voltage of 0.28 V, a short circuit current density of 0.25 mA/cm2 and a power conversion efficiency of 0.60 %..

Keywords:

Compact Layer, Mesoporous Layer, Solar Cell Perovskite, TiO_2

MAT1B - 4

ZnO-Nanorods Formation for Dye Sensitized Solar Cells Applications

Rangga Winantyo[1,a] and Kenji Murakami[2]

[1]*Department of Engineering Physics Universitas Multimedia Nusantara Tangerang, Indonesia*
[2]*Graduated School of Integrated Science and Technology Shizuoka University Hamamatsu, Japan*
[a]*Rangga.winantyo@umn.ac.id*

Different morphology of Zinc Oxide (ZnO) can be obtained through various synthesizing method. Different ZnO morphology can be seen as the result from waterbath synthesizing method under different conditions. Replacing ZnO nanoparticle with ZnO vertically aligned nanorods shows much higher energy conversion efficiency. Yet, vertically aligned nanorods can be grown through the difficult and expensive methods. Several researchers have studied one-dimensional (1D) nanorods growth on homogeneous film with various growth conditions. However, there have been few research on ZnO nanorods grown on ZnO seed layers by using waterbath method. In this research, vertically align nanorods with an optimum size ratio will be formed through simple waterbath method. This method has shown that the ZnO nanorods are well aligned and grown with a high density and uniformity on the substrate. X-ray diffraction pattern show that the nanorods are growing along [001] direction. The density, diameter, and length of ZnO nanorods can be altered by changing the growth condition. All samples were characterized by scanning electron microscope, Xray diffraction, and micro-Raman spectroscopy. To investigate precursor's effect, zinc nitrate and zinc acetate was used for preparing the solution. The results demonstrate that the morphology and alignment of ZnO nanorods are determined by the precursor's type and deposition time.

Keywords:

DSSC, Nanorods, Nanostructure, One-Dimensional, Thin Film, Waterbath, ZnO

MAT1B - 5

Synthesis and Characterization of Carbon Material Obtained from Coconut Coir Dust by Hydrothermal and Pyrolysis

Cipta Panghegar Supriadi[1,a*], Evvy Kartini[2], Wagiyo Honggowiranto[2], Kris Tri Basuki[1]

[1]*Nuclear Chemical Engineering, Polytechnic Institute of Nuclear Technology, National Nuclear Energy Agency, Yogyakarta, Indonesia*

[2] *Center for Science and Technology for Advanced Materials, National Nuclear Energy Agency, South Tangerang 15314, Indonesia*

[a]*cipta255@gmail.com,* [b]*evvy.kartini@gmail.com,* [c]*kristri_basuki@batan.go.id*

Since 2004, graphene became an rising star due to its superior properties. However, limited scale producing method made graphene costly. Beside that, the existing method required chemical that would be detrimental to environment. Therefore, Coconut coir dust (CCD) was used as carbon precursor in this research to provide intermediate-product for further graphene production. Firstly, CCD sieved into 100 mesh was carbonized through a hydrothermal method at temperature of 235oC, 250oC, and 265oC for 4 hours. Then, The obtained solid residue was pyrolized at 1000oC for 2 hour under the protection of nitrogen (N2). Furthermore, The hydrothermal solid residue labeled as CHT_(hydrothermal temperature) and the pyrolisis product named as SP_(hydrothermal temperature) both sample characterized using SEM, XRD and EDS. In addition, Raman characterization was done for SP samples. In the end of process (SP), the XRD pattern showed two broad peak centered around 2θ ~24o and 44o corresponded to (002) and (100) graphite plane. Moreover, this pattern had a similarity to that of reduced-graphene oxide. SEM images showed a sheet-like microstructure which was caused by undegraded lignin. The perforated and corrugated sheet formed after pyrolisis which confirmed the formation of reducedgraphene oxide. Furthermore, The Raman result indicated that higher hydrothermal temperature lead to an increasing integrated ID/IG ratio. The ratio were 1.62, 1.71 and 1.77, for SP 235, SP 250, and SP 265, respectively. From the research, it was concluded that the carbonaceous material formed through subsequent hydrothermal and pyrolysis process contained mixture of amorphous-carbon form and graphene-like cluster. In addition, showed similar structure with reduce-graphene oxide.

Keywords:

Graphene, Hydrothermal, Pyrolisis, Carbonization, Reduced Graphene Oxide Optimization

MAT1B - 6

An Analysis on the Effect of the Electrolyte Resistivity Over the Geometric Features (i.e. Pore Diameter and Pore Density) of Anodic Aluminium Oxide (AAO) Films Produced by Single-Step Anodization

Vika Rizkia[1,a], Johny Wahyuadi Soedarsono[2,b], Badrul Munir[2,c], Bambang Suharno[2,d]

[1]*Department of Mechanical Engineering, Politeknik Negeri Jakarta, 16425, Indonesia*
[2]*Department of Metallurgy and Materials Engineering, Universitas Indonesia, 16424, Indonesia*
[a]*vika.rizkia@mesin.pnj.ac.id,* [b]*jwsono@metal.ui.ac.id,* [c]*bmunir@metal.ui.ac.id,* [d]*suharno@metal.ui.ac.id*

Nanoporous anodic aluminum oxide (AAO) layers were successfully fabricated on aluminum foil by anodizing process in oxalic acid and mixed electrolytes of sulfuric and oxalic acid. The effect of electrolyte resistivity on the morphology of nanoporous AAO such as pore diameter and pore density was investigated. Morphology of nanoporous AAO layers was examined by using field emission scanning electron microscopy (FE-SEM) and analyzed by using image analysis software. The results showed that anodizing in mixed electrolytes (sulfuric and oxalic acid) produced much smaller pore diameter and much higher pore density at lower voltage compared to anodizing in single oxalic acid. The pore diameters ranged from 14 to 52 nm and pore density 34-106 pores/500x500 nm2 for anodizing process in oxalic acid. Anodizing process in the mixed electrolytes resulted in pore diameters within the range of 7-14 nm, and the pore densities within the range of 211- 779 pores in 500 x 500 nm2 . Overall, increasing of electrolyte resistivity within the same solution leads to decreasing of pore diameter.

Keywords:

Anodic Aluminum Oxide, Electrolyte Resistivity, Mixed Electrolytes, Oxalic Acid, Pores

MAT1B - 7

The Characterization of Pore Structure and Capillary Sintered Basalt for Wick Heat Pipe Developed

Luh Putu Ike Midiani[1,3], Wayan Nata Septiadi[2], I Nyoman Suprapta Winaya[2]

[1]*Program Doktor Ilmu Teknik, Pascasarjana Universitas Udayana, Denpasar-Bali*
[2]*Teknik Mesin Universitas Udayana, Kampus Bukit Jimbaran, Badung-Bali*
[3]*Teknik Mesin Politeknik Negeri Bali, Kampus Bukit Jimbaran, Badung-Bali*

Heat pipe is one of heat transfer device is a passive cooling system. The device uses a certain size which contains a certain fluid functioning as a heat conductor from heat to cold side. Heat pipe contribution to engineering field is as electronic cooling, solar heater, air conditioning and HVAC system. Heat pipe basically consists of three components; they are container, working fluid and wick. A lot of research had been undertaken to develop components of heat pipe. One of components which will be developed in this research is wick structures. It is a component functioning to generate capillary pressure to flow working fluid from condenser to evaporator. Currently, wick is made of metal which is easily oxidized and often caused corrosion problems. This condition will affect the heat pipe thermal performance, force capillarity and working fluid boiling process. An alternative direct method to improve the wick structure of heat pipe is using basalt. Basalt is one of non metal materials, from volcanic lava, having potential as wick material since it does not react with water and inflammable. In addition, it also has hardness and good thermal feature. The purposes of this experimental study are to examine and analyze basalt as a wick structure. This study was undertaken by making basalt powder of 100 mesh. The particle size and shape of basalt powder was measured with SEM. Its chemical composition was tested with EDS. Furthermore samples were prepared in cylinder form with varying of compaction pressure. Samples tested to know the pore structure and capillary pumping amount of basalt. The test result showed that wick pore structure using basalt has a structure which can be used as wick heat pipe with sufficient capillarity force.

Keywords:

Heat Pipe, Wick, Pore Structure, Capillary, Basalt

MAT2 - 1

The Implementation of the Track Link Tank Manufacturing for a Light Type Army Tank as a Substitution Imported

Hafid[1,a] and Sri Bimo P.[1]

[1]*Metal Industies Development Centre (MIDC) - Ministry of Industry Indonesia*
Jl. Sangkuriang No. 12 Bandung 40135
[a]*hafidochan@yahoo.com*

The Indonesia dependency level of track link tank component import are still very high, expensive, and long time procurement, therefore distrub the operational readiness of army tank when needed (Hafid & Sri B.P., 2016). In order to reduce import dependency of track link tank, the implementation of the track link tank manufacturing for a light type army tank as a substitution imported has been done (MIDC, 2015). The purpose of research is to produce the track link tank prototype which reguired by the user, a good quality and added value with high price competitive. Materials technique that used is steel bainite (Sri B.P, et al, 2015) with the superiority hardness and high tensile strength but still strong (ductile). The implementation methods was taken, which cover: (1) design casting, (2) pattern making, (3) molding sand (4) melting and pouring, (5) heat treatment, (6) testing of mechanical properties before and after heat treatment, namely: tensile strength, hardness test, chemical composition, microstructure analysis by SEM/EDS, ductility test, wear resistance, and (Sri B.P, et al, 2015) (7) application field test a prototype in army tank (Hafid,et al., 2016; 2014). Level 9 of Technlogy Readiness Levels (TRL) is obtained based on the result of the techno-meter measurement. Based on the economical analysis obtained by the benefit cost ratio (BCR) = 1,67% > 1 (good) (MIDC, 2015). By mastering the technology of the track link tank manufacturing for a light type, we can develop any other the track link tank manufacturing, such as medium tank type of track link tank.

Keywords:

Track Link Tank, Benefit Cost Ratio (BCR), Technology Readiness Levels (TRL)

MAT2 - 2

The Role of Sr And TiB on Mechanical Properties of Aluminium 6061 Composite Produced through Stir Casting Method

Anne Zulfia[1*], Egy Ciptia Putro, Reza Mohammad Aditya[1] and Sergi Andiva[1]

[1]*Department of Metallurgy and Materials, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI, Depok 16424, Indonesia*

Aluminium 6061 composites have been succesfully produced by stirr casting method. The process involved melting aluminium at 800oC and mixed with AlSr, TiB and Mg to produce master alloy of matrix phase, then degassing to remove all of gas entrapped in molten aluminium by argon. There are two types of particles reinforced added into aluminium to produce aluminium composite such as SiC and Al2O3. The particles reinforced addition for both SiC and Al2O3 are started from 2vf-% to 10vf-% to obtain the optimum compostion which have good mechanial propperties. The addition of 10wt-% Mg is to promote wetting between matrix and reinforced while the addition of AlSr and TiB are to improve mechanical properties by modifying the eutectic structure as well as grain refinement of the matrix phase. The two composites are compaired both mechanical properties and microstructure analysis. The mechanical properties of Al/SiC composites such as tensile strength, elongation, and hardness have a maximum value at addition of 10 Vf-% SiC with the value up to 230 MPa, 6.5%, and 62 HRB respectively. While for Al/Al2O3 composites have the highest tensile strength and elongation at 6 Vf-% Al2O3 addition with the value of 224 MPa and 7% respectively, but the highest hardness is obtained at addition of 10 Vf-% Al2O3 reaches to 55 HRB. The percentages of porosity were increased for both composites along with the increase of particles reinforced. The microstrutures for both composites are similar since they have the same matrix and Sr clearly changed primary Mg2Si become finer chinese scripts, while TiB as grain refiner worked efficiently for higher reinforced particles addition because the grain size reduced for both composites.

Keywords:

Al 6061, SiC, Al2O3 , Mechanical Properties, Stir Casting

Mechanical Properties of Nano SiC-Reinforced Aluminium A356 Fabricated by Stir Casting Method

Donanta Dhaneswara[1,a], Anne Zulfia Syahrial[1,b], Luthfi Noviardi Andani[1,c], Nofrijon Sofyan[1,d]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424 Indonesia*
[a]*donanta.dhaneswara@ui.ac.id*
[b]*zulfiaanne@gmail.com*
[c]*luthfinoviardi@gmail.com*
[d]*nofrijon.sofyan@ui.ac.id*

Nano SiC-reinforced aluminumA356 (A356/SiC) has been successfully fabricated using stir casting method. The specimen was fabricated by adding various nanoSiC concentrations, i.e. 0, 0.10, 0.15, 0.20, 0.25, and 0.30 wt.%, at fix 1 wt.% magnesium into aluminum A356 melt. After stirring at certain time, the mixture was poured into the mold that has been preheated at 350oC for 5 minutes. The mechanical properties were characterized using tensile, hardness, and wear testing,whereas the microstructural observation was performed using an optical microscope.The results show that the mechanical properties wereoptimum at 0.25 wt.%nanoSiCwith a strength of 175.57 MPa (21.87%), toughness of 0.0287 Joules/mm3 (14.8%), hardness of56.54 HBN (50%), and wear resistance of 1.75 x 10-5 mm3 /mm (21.13%). These results indicate that the fabrication approach was successful in producing cast MMCs samples and the use of nanoSiCand magnesium as awetting agent with continuous stirring were found to promote the wettability of SiC and A356 matrix alloy and thus result in reasonable mechanical properties of the composite.

Keywords:

Aluminum A356, Nano SiC, Reinforce, Metal Matrix Composite, Stir Casting

MAT2 - 4

Mechanical Properties of Al_2O_3-Reinforced Aluminum A356 with Grain Refiner Al-$_5$Ti-$_1$B Fabricated by Stir Casting Method

Donanta Dhaneswara[1,a], Anne Zulfia Syahrial[1,b], Raka Nuralif Verdiyanto[1,c]

[1]*Advance Materials Research Group, Department of Metallurgy and Materials, Faculty of Engineering, Universitas Indonesia, Jakarta, Indonesia*
[a] *donanta.dhaneswara@ui.ac.id*
[b] *zulfiaanne@gmail.com*
[c] *raka.nuralif@ui.ac.id*

Al2O3 reinforced aluminium A356 has been succesfully fabricated using stir castng method. The development of current technology requires a material that has properties of light, strong, tough, corrosion resistance, wear resistance, and some other advanced properties. Therefore composite material was developed. Composite material can be used in a wide range of strategic sectors such as automotive, military, aerospace, and electrical industries. This study aims to develop composite material that consist of aluminum A356 as matrix and micro Al2O3 as reinforced, and 8 wt% magnesium as wetting agent with the addition of grain refiner TiB of 0; 0.01; 0.0347; 0.0362; 0.0622; and 0.0689 wt% using stir casting method. Material characterization consisted of tensile testing, hardness testing, wear testing, chemical composition testing (OES and XRD), and microstructure testing (OM, SEM and EDX). The test results showed that the addition of 0.0347 wt% TiB capable of reducing the size and changing the shape of a long and coarse grain become round and fine that increasing tensile strength, hardness, and wear resistance significantly, but decreasing elongation and ductility.

Keywords:

Al_2O_3, Aluminum A356, Composite, Grain Refiner TiB, Stir Casting

Effect of Cold Rolling and Annealing Temperature on the Recrystallization and Mechanical Properties of Al-4.7Zn-1.8Mg (Wt. %) Alloy Fabricated by Squeeze Casting

Rachman Kurnia[1], Bondan T. Sofyan[1,a]*

[1]*Department of Metallurgy and Materials Engineering*
Faculty of Engineering Universitas Indonesia
Kampus UI Depok 16424, Indonesia
[a]*bondan@eng.ui.ac.id*

Aluminium alloys are developed as airplane body due to its lighter weight compared to steel and good formability. Aluminium 7XXX series with Zn and Mg alloying elements are commonly used because of its mechanical properties can be improved through deformation process. Deformation such as cold rolling may increase the hardness of an alloy through strain hardening. Annealing process after deformation process will recover ductility through stress relieve, recrystallization and grain growth mechanisms. This research aimed to find out the effect of cold rolling and annealing temperature on the recrystallization and mechanical properties of Al-4.7Zn-1.8Mg (wt. %) alloy. The alloy was produced by squeeze casting process. Homogenization was conducted at 400 ^{o}C for 4 hours followed by cold rolling with degree of deformation of 5, 10 and 20 %. The samples with 20 % of deformation were then annealed at 300, 400 and 500 ^{o}C for 2 h. Vickers hardness test was performed on the cold rolled and annealed samples to reveal strain hardening effect and subsequent recrystallization process. Microstructure was observed by using optical microscope and Scanning Electron Microscope (SEM). The results showed that the higher the deformation, the more elongated the grains. Deformation of 5, 10 and 20 % led to grain shape ratios of 2.19, 3.19 and 4.59, respectively and increase in the hardness of the alloy from 69.5 HV to 95.3, 100.1 and 105.4 HV, respectively. Annealing at 300 ^{o}C resulted in recovery, while at 400 ^{o}C, recrystallization occurred. Grain growth was observed after annealing at 500 ^{o}C for 2 h. The annealing temperature of 300, 400 and 500 ^{o}C decreased the hardness of the alloy from 105.4 HV to 71.5, 96.8 and 95.3 HV, respectively.

Keywords:

Al-Zn-Mg Alloy, Annealing, Cold Rolling, Grain Growth, Recrystallization

MAT2 - 6

Non Treatment, T4 and T6 on Tensile Strength of Al-5.9Cu-1.9Mg Alloy Investigated by Variation of Casting Temperature

Hasan Akhyar[1,2,a*], Priyo Tri Iswanto[1], Viktor Malau[1]

[1]*Department of Mechanical and Industrial Engineering, Gadjah Mada University (UGM), Jln. Grafika No.2, Yogyakarta, 55281, Indonesia*

[2]*Department of Mechanical Engineering, Syiah Kuala University, Jln. Syech Abdurrauf No.7 Darussalam – Banda Aceh, 23111, Indonesia*

[a]*akhyar@unsyiah.ac.id*

In this experiment, the influence of non-treated (NT), natural aging (T4) and artificial aging (T6) heat-treatments was investigated on the tensile strength of Al-5.9Cu-1.9Mg at different casting temperatures. Three levels of casting temperatures were used: 688, 738, 788 ^{o}C while the mold temperature was kept constant at 220^{o}C. The cast sample was heattreated by natural aging and artificial aging techniques. The results show that the tensile strength in the non-treated sample decreases initially and then rises slightly with increasing casting temperature. The effect of casting temperature on T4 involved first an increase in tensile strength and then a decrease when elevating the casting temperature, but with no significant effect. In the T6 treatment, the tensile strength first decreases followed by a slight increase with increasing casting temperature. The heat treatment process improved the tensile strength in the three different samples, except at a casting temperature of 768^{o}C.

Keywords:

Al-Cu Alloy, Casting Temperature, Metal Casting, Heat Treatment, Tensile Strength

MAT2 - 7

Debinding Rate Enhancement of 17-4 Precipitation Hardening Stainless Steel Solvent Debinding on Metal Injection Molding Process as the Material for Orthodontic Bracket

Sugeng Supriyadi[2], Deni Ferdian[1], Gerra Maulana[1], Rizki Hidayatullah[1], Bambang Suharno[1]

[1]*Metallurgy & Material Engineering, University of Indonesia, Depok 16424, Indonesia*
[2]*Mechanical Engineering, University of Indonesia, Depok, 16424, Indonesia*

Brackets fabrication should be done by a suitable process to produce great result. Processes commonly used are investment casting, machining, and metal injection molding. Investment Casting has a drawback in which the surface roughness is quite high for the standard of brackets and require further processing. Machining is done by removing unwanted part to get desire shape, whereas bracket shape requires a high accuracy and is quite complicated. In Metal Injection Molding, feedstock is injected into a mold where complicated shapes can be achieved with a better surface roughness. The weakness is the stages within the process are quite long. One of the problem is the efficiency of debinding stage. We conducted an experiment to enhance binder removal rate through solvent debinding with stirring and under vacuum condition. Sample use for this experiment is a cubic shape of 0.5 x 0.5 x 0.5 cm3 . Experiment is done on magnetic stirrer and in vacuum furnace. The temperature is hold at 50oC. Drying process afterward is done in the vacuum furnace for 1 hour with temperature around 50oC. Amount of binder left is confirmed by STA and the particle morphology is seen by SEM. Results showed that stirring treatment enhances binder removal rate due to stirring mechanism that causes possibility of collisions between particles increases. Binder removal rate on the vacuum treatment has a mechanism similar to stirring, but with the addition of the solvent to be done on a regular basis due to decrease of solvent boiling point under vacuum. There were no cracks found on the surface with an increased rate of debinding. Stirring is use for experiment with sample of actual bracket orthodontic form. Debinding rate of the bracket sample is faster than the cubic sample. This result is affected by the dissimilarity on the volume to surface area.

Keywords:

Orthodontic Bracket, SS 17-4PH, Metal Injection Molding, Solvent Debinding

Casting Design Modification to Improve Casting Yield in Producing Thin Wall Ductile Iron Plate

Rianti Dewi Sulamet-Ariobimo[1,a], Yun Gemilang[2,b], Dhonanta Dhaneswara[3,c], Johny Wahyuadi Soedarsono[3,b], Bambang Suharno[3,c]

[1]*Mechanical Engineering Department, Faculty of Industrial Technology, Universitas Trisakti, Jakarta 11440, Indonesia*
[2]*Foundry Engineering Bandung Polytechnic for Manufacturing, Indonesia*
[3]*Department of Metallurgy and Material, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[a]*riantiariobimo@trisakti.ac.id,* [b]*yun_gf@yahoo.com*

Cooling rate plays an important role in the formation of thin wall ductile iron microstructure due to their thickness, which is 3 mm below based on Stefanescu. Cooling rate is closely related to casting design and determines the microstructure. This paper discusses the effect of casting design modification to casting yield and microstructures. Modification was made on a patented design used previously to produce thin wall ductile iron plates. The design was minimized and casting simulation was used to analyze castability of the design. After that, the design were casted in several pouring temperatures. Improvement was made to casting design based on the failure during the experiment. Casting process took place after simulation analysis. The casting product was fully casted as shown by the simulation. The casting yield has improved to 28%. When all plates were examined for microstructure, the result showed that all the microstructure of the plates was not graphite in ferrite matrix as occurred in the patented design but it was graphite in pearlite matrix.

Keywords:

TWDI, Casting Design, Cooling Rate, Microstructure

Synthesis and Electrochemical Characterization of New Li2O-P2O5 Compounds for Solid Electrolytes

Heri Jodi[1,2], Anne Zulfia Syahrial[1], Sudaryanto[2], Evvy Kartini[2,*]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

[2]*Center for Science and Technology of Advanced Materials. BATAN, Kawasan Puspiptek Serpong, Setu, Tangerang Selatan, Banten 15314, Indonesia*

The solid electrolyte is very interesting because of its potential to be applied in a wide variety of electrochemical devices. One of the most stable solid electrolytes is Li3PO4. However, this material has low enough conductivity to be applied to a device such as an electrolyte. The previous study has reported that the mixture of xLi2O-P2O5 with x=2 has a conductivity greater than the conductivity of Li3PO4, while for x=1 reported that the mixture is yielding an amorphous structure. In this study, new compositions of the xLi2OP2O5 compounds with x=1.5 and 1.8 were prepared by solid state reactions. The prepared compounds were characterized using X-ray Diffraction Spectrometry (XRD), Scanning Electron Microscopy (SEM), and Electrochemical Impedance Spectroscopy (EIS) measurements in order to investigate their structure, morphology, and electrochemical properties. The XRD characterization showed that both of the samples were composed mainly of Li4P2O7 crystals. Agglomeration of particles was observed in both samples. The conductivity was in the order of 10-6 S/cm which was higher by three orders of magnitude than that of Li3PO4. Evaluated power exponent of conductivity indicated that the longrange drift of ions may be one of the sources of ion conduction in the both observed samples. The nature of dielectric loss indicated that the conduction in the samples was more predominantly dc conduction.

Keywords:

Solid Electrolytes, Li2O-P2O5, Electrochemical Impedance Spectrometry, Conductivity, Dielectric

MAT3A - 2

Optimizing Anode Performance Using Silicon Nanoparticle to $Li_4Ti_5O_{12}$ as Prepared by Hydrothermal Mechanochemical Process with Li_2CO_3 as Lithium Ion Source

Bambang Priyono[1,a*], Nita Dianova[1,b], Anne Zulfia Syahrial[1,c], Achmad Subhan[2]

[1]*Department of Metallurgical and Materials Engineering, University of Indonesia, Depok West Java, Indonesia*
[2]*Physics Laboratory, LIPI, Puspiptek Serpong, Indonesia*
[a]*bambang.priyono@ui.ac.id*, [b]*ndianovanita@gmail.com*, [c]*anne@metal.ui.ac.id*

Lithium titanate (Li4Ti5O12)/LTO is one of more favourable materials to be used as anode electrode to replace graphite in Li-ion battery application. The LTO has a crystal structure that is more stable than graphite, and undergoes less strain during lithium intercalation process. However, along with the increasing demand for batteries with high performance, the capacity of LTO also needs to be increased, among others by combining with a high capacity material, i.e: silicon, which theoretical capacity can reach 4200 mAh/g, but with volumetric strain of 300%. To minimize volume expansion effect, nano-scale silicon particle is used to form the LTO/Si nano-composite. This research is carried out to synthesize the spinel LTO prepared by hydrothermal and mechanochemical process from xerogel TiO2. During preparation of slurry mixture of active material to make anode sheet, the LTO is mixed with silicon nano-particle at 5%, 10% and 15% by weight. The coin cell type battery is assembled with lithium metal as the counter electrode. The material characterization instruments used are X-Ray diffraction (XRD) and Transmission Electron Microscope (TEM) with Energy Dispersive Spectrometer (EDS) showing the elements mapping. The battery performance is tested using electrochemical impedance spectroscopy (EIS), cyclic voltammetry (CV) and charge discharge (CD). From EIS testing, the conductivity values of the samples decrease along with the increasing weight of Si nano-particles. The CV test shows that the highest capacity of 197.09 mAh/g is achieved on the sample with 5wt% Si-nano. The CD test shows that this LTO/Si nano-composite is capable to withstand at high charge/discharge rate at until 12 C exceeding the electric car battery requirement at 10 C.

Keywords:

$Li_4Ti_5O_{12}$/LTO Anode, Silicon Nano-Particles, Composite, Battery Capacity, Half-Cell Battery

MAT3A - 3

Characteristic of LiFe(1-x)VxPO4/C Using Carbon Pyrolyzed from Table Sugar for Lithium Ion Battery Cathode

Nofrijon Sofyan[1,2,*], Adlan Mizan[1], Anne Zulfia[1,2], Achmad Subhan[3]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

[2]*Tropical Renewable Energy Center, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

[3]*Research Center for Physics, Indonesian Institute of Science (LIPI), Puspiptek Serpong, Cisauk-Banten, Indonesia 15314*

Used of carbon pyrolyzed from table sugar in the synthesis of LiFe(1-x)VxPO4/C for lithium ion battery cathode has been examined. The process was begun by synthesizing LiFePO4 through a hydrothermal method with the precursors of LiOH, NH4H2PO4 and FeSO4.7H2O. The as-synthesized LiFePO4 was then mixed with various H4NO3V concentrations and 3 wt.% of carbon pyrolyzed from table sugar and calcined for 2 hours at 400 °C. The result was ball-milled and was then characterized using a thermal analyzer to determine the transition temperature at which sintering temperature of 700 °C for 4 hours was obtained. Xray diffraction (XRD) was performed to analyze the crystal structure whereas scanning electron microscope (SEM) was used to examine the microstructure and surface morphology. XRD results show that the phase LiFe(1-x)VxPO4/C has been formed with an olivine-based structure. SEM results showed the distribution of LiFe(1-x)VxPO4/C particles were mostly evenly distributed. The batteries were prepared from the as-synthesized materials and were tested using electrochemical impedance spectroscopy (EIS), cyclic voltammetry (CV) and charge and discharge (CD) performance test. The EIS results showed that vanadium improved the conductivity. The same was true with the carbon even at a smaller value compared to that of the commercial carbon black. The performance test showed that the addition of vanadium increased the capacity of about 51.06 mAh/g with a potential of 3.581 V at charging and 49.42 mAh/g with a potential of 3.319 V at discharging. These results are promising in terms of using table sugar as a cheap carbon source for lithium ion battery cathode development.

Keywords:

Battery Cathode, Lithium Ferro Phosphate, Hydrothermal, Pyrolysis, Table Sugar

MAT3A - 4

Molecular and Ionic Mobility of Chitosan Based Solid Polymer Electrolyte for Lithium-Ion Battery

Sudaryanto[1], Evi Yulianti[1], Nur Shofiana Khaironi[2]

[1]*Center for Science and Technology of Advanced Materials, BATAN, Kawasan Puspiptek, Serpong, Tangerang Selatan, Banten, 15314, Indonesia*

[2]*Department of Physics, Mataram University, Jl. Majapahit 62, Mataram, NTB, 83125, Indonesia*

Ionic condutivity, the most vital electrolytes properties of chitosan based solid polymer electrolytes (SPE) was increased by several methods. In this study, the relation between polymer molecular mobilities and conductivity have been studied. The SPE were prepared simply by mixing lithium salt into chitosan solution, followed by casting method. The SPE micro-structure and segmental mobilities were studied by using X-ray diffractometer and mechanical test measurement, respectively. The conductivities were studied using electrochemical impedance spectrometer. Ionic mobility was studied based on ion transference number measurement. The results showed that the addition of nanoparticle, e.g. ZrO_2 decreased the chitosan crystalinity so that increased the molecular motion flexibility, but did not change the conductivity significantly. However, addition of lithium perchlorate (LiClO4) as lithium salt clearly increased the the chitosan conductivty up to 3 order (from 10-7 to 10-4 S/cm). A higher salt concentration leads to a higher segmental motion and cationic mobility.

Keywords:

Chitosan, Ionic Conductivity, Lithium-Ion Battery, Lithium Salt, SPE

MAT3A - 5

Preparation and Ionic Conductivity of $Li_{3.9}Ca_{0.1}Ti_5O_{12}$ Using Waste Chicken Eggshells as Ca Source for Anode Material of Lithium-Ion Batteries

Achmad Subhan[1], Dedy Setiawan[2], Sitti Ahmiatri Saptari[2]

[1]*Indonesian Institute of Sciences-Research Center for Physics (LIPI), Serpong, Indonesia*
[2]*Physics Department UIN Syarif Hidayatullah Jakarta, Ciputat, Indonesia*

$Li_{3.9}Ca_{0.1}Ti_5O_{12}$ has been synthesized as anode material for lithium-ion batteries parallel with $Li_4Ti_5O_{12}$ anode material using solid state reaction method in an air atmosphere. $LiOH.H_2O$, TiO_2, and waste chicken eggshells in the form of $CaCO_3$ were chosen as sources of Li, Ti, and Ca respectively and prepared using stoichiometric. The phase structure, morphology, and electrochemical impedance of as-prepared samples were characterized using XRD, SEM, and EIS. The XRD characterization revealed that in $Li_{3.9}Ca_{0.1}Ti_5O_{12}$ sample, all amount of dopant had entered the lattice structure of $Li_4Ti_5O_{12}$. The EDX image also detect the existence of Ca in the structure of $Li_{3.9}Ca_{0.1}Ti_5O_{12}$. The EIS characterization revealed that the $Li_{3.9}Ca_{0.1}Ti_5O_{12}$ sample had lower electrochemical impedance compared to the $Li_4Ti_5O_{12}$ sample. The diffusion coefficient were obtained by Faraday's method, and exhibited that the $Li_{3.9}Ca_{0.1}Ti_5O_{12}$ sample (1.46986 x 10-12 cm2 /s) had higher ionic conductivity than the $Li_4Ti_5O_{12}$ sample (4.40995 x 10-16 cm2 /s). According to the cycle performance test, the $Li_{3.9}Ca_{0.1}Ti_5O_{12}$ sample also had higher charge-discharge capacity and stability compared to the $Li_4Ti_5O_{12}$ sample.

Keywords:

$Li_{3.9}Ca_{0.1}Ti_5O_{12}$, Anode Material, Lithium-Ion Batteries, Waste Chicken Eggshell, Ionic Conductivity

Flux Coating Effect of SMAW 308L Electrode on Its Mechanical Properties and Corrosion Resistance for Cryogenic Application

Andi Rustandi[1*], Suganta Handaru[2]

[1]*Department of Metallurgy and Material Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

[2]*PT. Voestalpine Bohler Welding Asia Pacific, Cikarang Sel. 17530, Bekasi, Indonesia*

Flux coating type of stick electrode of shielded metal arc welding (SMAW) could influence the properties of weld metal. This work described a study of mechanical and corrosion behavior of austenitic stainless steel weld metal grade 308L which deposited by using different type electrodes, namely rutile electrode, lower nitrogen content and basic electrode. Both electrodes were designed to produce the same ferrite content namely 4FN. Several tests such as tensile at room temperature, Charpy impact V-notch and lateral expansion at cryogenic temperature -196oC were conducted to observe the mechanical behavior. Electrochemical testing such as cyclic polarization method was also performed. The used of basic electrode significantly increased charpy impact by 16%, lateral expansion by 51% and slightly increases tensile strength by 6%. Pitting corrosion resistance value was shown by lower properties for weld metal 308L which had lower nitrogen content while rutile and basic type electrode had better its resistance.

Keywords:

Austenitic Stainless Steel 308L, Weld Electrode, Cryogenic, Flux Basicity, SMAW

Effect of Repeated Weld-Repairs on Microstructural and Mechanical Properties of Stainless Steel 304L and 316L

Winarto Winarto[1], Muhammad Anis[1], and Refnaldi[1]

[1]*Department of Metallurgical and Materials Engineering, Universitas Indonesia, Depok - 16424, Indonesia*

An investigation is performed into the effects of repeated weld-repairs on the microstructural and mechanical properties of stainless steel 304L and 316L. In preparing the specimens, the weld is fabricated using gas tungsten arc welding (GTAW), which was welded once is assigned 0R. The weld bead is then ground away, and the weld is repaired using the same gas tungsten arc welding (GTAW). Three different weld-repair specimens are fabricated, namely one specimen repaired just one time (designated as 1R), one specimen repaired two times (designated as 2R) and one specimen repaired five times (designated as 5R). Specimen with different conditions of gas tungsten arc welding repairs were studied by examining the micro structural changes, the chemical composition of the phases changes, the grain size change on the heat affected zone and the change on their mechanical properties. The microstructural and fractographic of impact specimen were investigated using optical microscopy (OM) and scanning electron microscopy (SEM). The chemical composition of the base metal was determined using optical emission spectrometer. The change on chemical composition of weld metal and heat affected zone were determined using energy dispersive spectrometry (EDS). Mechanical testing such as tensile tests, charpy impact test and micro hardness tests were conducted. The results show that weld-repair hardness on the heat affected zone decreased as the number of repairs increased. The tensile test results showed that repeating repair welding did not have much adverse effect on yield and ultimate tensile strength. The impact test showed a significant reduction in the absorbed energy values as the number of weld repairs increased. Weld repair on 306L stainless steel have a significant reduction in mechanical properties compared with the 304L stainless steel as the number of weld repairs increased.

Keywords:

Austenitic Stainless Steel, Weld-Repair, Heat Affected Zone, Microstructure, Mechanical Properties

MAT3B - 3

Microstructures and Hardness of the Experimental $_{57}Fe_{15}Cr_{25}Ni$ Steel Around TIG Weld-Joints

Parikin[1,a*], M. Dani[1], A.K. Rivai[1], A.H. Ismoyo[1], R. Iskandar[2], A. Dimyati[1]

[1]*Center for Science and Technology of Advanced Materials, National Nuclear Energy Agency (BATAN), Puspiptek Area, South Tangerang 15314, Indonesia*
[2]*Central Facility for Electron Microscopy (GFE), RWTH Aachen University, Ahorn strausse 55, D-52074 Aachen,Germany*
[a]*farihin@batan.go.id*

Microstructures and hardness of the $_{57}Fe_{15}Cr_{25}Ni$ steel around TIG weldjoints with base metal filler, have been investigated using an Optical-Electron Microscope (OM-SEM) and Vickers Hardness tester. Results show that welding process was able to restructure constituent atoms into regular and irregular-crystal lattice. After rapid cooling, weld metal forms dendritic (columnar) structure. Porosities are found inside the grains. Instead of, slow cooling affects in HAZ, resulting grain structures. Crystal lattice becomes more organized and larger. While basemetal forms circular-shaped nets that covered large area inside thick and thin grain boundaries. Diffraction patterns revealed that texturing occurred in weld metal. Crystallite orientation alters from (111) to (200) and (220) planes. Weld metal profile broadens (amorphous), showing full width half maximum (fwhm) is bigger than in HAZ and basemetal. Weld metal hardness value is about 121 HV, slightly lower than hardness of basemetal (130 HV). Being in HAZ had highest hardness (152 HV). Hardening is also influenced by carbon and outer oxygen-migration to the grain boundaries. They form colonies i.e.: chromium carbide, aluminum carbide, aluminum oxide, silicone oxide and silicon carbide (precipitation hardening). Welding (heat) may change microstructures and hardness in HAZ and weld metal region. Both of them would be brittle and very critical in responding to applied loads.

Keywords:

$_{57}Fe_{15}Cr_{25}Ni$ steel, Hardness, Microstructure, Crytal Structure, TIG-Weld

MAT3B - 4

Effect of Sub-Zero Treatment on Microstructures, Mechanical Properties, and Dimensional Stability of AISI D2 Cold Work Tool Steel

Wahyuaji Narottama Putra[1*], Pandega Pramaditya Putra Pramuka[1], Myrna Ariati Mochtar[1]

[1]*Dept. Of Metallurgy & Materials Engineering, Faculty of Engineering, Universitas Indonesia. Kampus UI Depok, Jawa Barat, 16424, Indonesia*

AISI D2 tool steel has become important material in the industry, especially for mold and dies maker and also used for cutting tools. Conventional hardening process such as annealing and quenching is normally done for this kind of steel as it needs high hardness and wear resistance properties. To further improve its performance, sub-zero treatment can be performed. Quenching the steel in very low temperature e.g. liquid nitrogen, will help to remove unwanted retained austenite, thus provide better dimensional stability. In this study, AISI D2 tool steel samples were subjected to austenitizing temperature of 1030°C and then quenched using different quenching media i.e. air, oil, and liquid nitrogen. Vickers test result showed that after quenching process, the hardness for those samples were 762 HV, 822 HV, and 735 HV for air, oil, and liquid nitrogen quenched respectively. Microstructure analysis showed that retained austenite volume fraction after quenching process were 7.50%, 3.93%, and 3.18% for air, oil, and liquid nitrogen quenched respectively.

Keywords:

AISI D2 Tool Steel, Dimensional Stability, Hardening Process, Retained Austenite, Sub-Zero Treatment

MAT3B - 5

Enhancement of Mechanical Properties of Cast Beta-Type Titanium Alloy by Aging Treatment

Zuldesmi mansjura[1*] , Hendro Maxwell Sumual[1]

[1]*Department of Mechanical Engineering of Education, Faculty of Engineering, Manado State University, Tondano, Indonesia*

Beta type Ti-29Nb-13Ta-4.6Zr alloy (TNTZ) is one of the titanium alloys which have gained much attention in dental applications. Dental precision casting is predominant for fabricating dental prostheses. However, there is a possibility for the mechanical properties of its casting to be degraded because of a α case, shrinkages and pores and a dendrite structure. One of the ways to enhance their mechanical properties is heat treatment process. Therefore, the aim of this study is to investigate the effect of aging treatment on mechanical properties and microstructure of TNTZ cast into magnesia based mold in order to improve its mechanical properties. As results, the Vickers hardness of the cast TNTZ after solution treatment is larger than that of the wrought TNTZ. The aging curve of the cast and the wrought TNTZ at an aging temperature of 673 K and 723 K exhibit almost similar pattern. For each aging time, the higher the aging temperature, the smaller the Vickers hardness for both alloys. Microstructures of cast TNTZ at various aging conditions consist of a dendritic structure and the average diameters of their grain size are around 40 μm. The diffraction peaks of precipitation of α and β phase s are detected in under aging (UA), peak aging (PA) and over aging (OA) conditions for both aging temperatures. However, the diffraction peak of ω phase is observed only in OA condition for cast TNTZ at aging temperature of 673 K. The highest tensile strength of the cast TNTZ and the wrought TNTZ at both aging temperatures are in PA condition and the elongation decrease continuously by increasing aging time. The tensile strengths of cast TNTZ in UA, PA and OA conditions at an aging temperature of 723 K are lower and their elongations are higher in comparison with those of 673 K. The high oxygen content seems to contribute to the poor elongation. SEM fractographs of the cast TNTZ at aging temperatures of 673 and 723 K in UA, PA and OA conditions show the brittle morphology with intergranular fracture that increases with increasing of aging time.

Keywords:

Titanium, Beta-Type Titanium, Biomaterial, Casting, Aging

MAT3B - 6

Optimizing the Substrate Preheating Process of High Velocity Oxygen Fuel Cobalt-Based Alloy Coating on Alloyed and Carbon Steels Mechanical Properties

Myrna Ariati[1*], Wahyuaji Narottama Putra[1], Raditya Perdana Rachmansyah[1]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia*

Tube boiler operating condition initiates common problems that can occur as a problem in the wear resistance material. It leads to a decreased function of the material so that it is necessary to repair or replacement. High Velocity Oxygen Fuel (HVOF) is regarded as one of the effective methods to increase the wear resistance of the material. In this study, the materials were ASTM SA213-T91 as a material commonly used for boiler tube and JIS G 3132 SPHT-2 as an alternative material. In the early stages, both of specimens were given initial surface heating with temperature variations 0, 50, 100 and 150oC. The materials were then coated with Stellite-1 using HVOF method. The material were then characterized for the microstructure, porosity, hardness distribution, and wear resistant. The results showed that the coating Stellite-1 as a top coat with HVOF method can improve the performance of the material. Microhardness increases from 220 HV to 770 HV on ASTM SA213- T91, while on the substrate JIS G 3132 SPHT-2 the microhardness increased from 120 HV to 750 HV. Better wear resistance was achieved with increasing preheating. Wear resistance of the materials increased from the range 3.69x10-7 at 0 °C preheating up to 0.89x10-7 on a specimen with initial surface heating 150oC. Porosity also decreases with the increasing preheating temperature.

Keywords:

High Velocity Oxygen Fuel, Stellite-1, Surface Heating

Corrosion Inhibition by a Caesalpinia Sappan L Modified Imidazoline for Carbon Steel API 5L Grade X60 in HCl 1M Environment

Norman Subekti[1], Johny Wahyuadi Soedarsono[1], Andi Rustandi[1], Adam Septiyono Arlan[1*]

[1]*Metalurgy and Material Department, Faculty of Engineering, Universitas Indonesia, Depok, Indonesia*

Acidizing is one of the stimulation technologies in the oil and gas industry by removing scale, rust , debris or other acid-soluble particulates on the pipe tubing internal surface. The most common acid used is HCl. In order to avoid problems such as pipe or casing tubing leak due to acidic corrosion, during the acidizing normally applied with inhibition treatment by inorganic corrosion inhibitor with various compositions including quaternary ammonium salts, solvent and often some type of a surfactant to strip oil from acid reactive surfaces. But, unfortunately most of these compounds are not only expensive but also toxic to marine environment. It is an obvious remark to point out the importance of low cost, green corrosion inhibitors which is safe to environment. Wood extract has become important as an environmentally acceptable, readily available and renewable resource for wide range of inhibitors. A Caesalpinia Sappan L modified imidazoline has been synthesized and used as a corrosion inhibitor for carbon steel in API 5L X60 in HCl 1M environment. The aim of investigation is to find low dosage-high efficiency green corrosion inhibitor.The testing techniques includes wheel test weight loss measurement, tafel polarization and Electrochemical Impedance Spectroscopy (EIS), Fourier Transform Infra-red Spectroscopy (FTIR). The results of weight loss studies correlated well with those of polarization and impedance Spectroscopy. Inhibition performance for both Caesalpinia Sappan L modified imidazoline (CS IMI) and Imidazoline (IMI) increases with increasing inhibitor concentration. The formulated Caesalpinia Sappan L modified imidazoline (CS IMI) and Imidazoline (IMI) inhibitors give a greater than 90% inhibition efficiency with dosage 25 ppm at temperature of 90-140°F. Caesalpinia Sappan L modified imidazoline (CS IMI) and Imidazoline (IMI) show comparable inhibition performance. But, at temperature 140 ^{o}F, Imidazoline (IMI) seems to have a slightly better performance, indicating better thermal stability. Caesalpinia sappan bioactive agent's are brazilein and chalcone and its inhibition mechanism by physosorption obey Langmuir Isotherm, this mode will control charge transfer at surface metal and electrolyte. This result confirm that Caesalpinia sappan modified immidazoline is very promising for the development of green corrosion inhibitors for oil and gas application.

Keywords:

Acidizing, Green Corrosion Inhibitor, Caesalpinia Sappan, Imidazoline , Tafel Polarization, Electrochemical Impedance Spectroscopy, Langmuir

Enhancement of CUI Inspection on Insulated Dead-Leg Piping in LNG Plant Bontang

I Wayan Yuda S.[1,a]

[1]*Technical Department, PT Badak NGL*
Bontang 75324, Kalimantan Timur, Indonesia
[a]*semaradipta@badaklng.co.id*

Maintaining plant integrity becomes a significant issue to sustain LNG plant operational. A proper decision in developing inspection program and strategy is highly required regarding the issue. In such LNG plant, piping system facilities act as one of important roles in transporting fluid where temperature varies widely from -160ºC up to 450ºC. On piping system, corrosion under insulation (CUI) is considered as one of frequent damage mechanism, which may lead to losses of plant integrity. Combination of CUI survey and risk based inspection (RBI) have been implemented effectively to manage this risk. CUI survey was conducted on the line, which is operated under the range of susceptible temperature. However, on the stream, which is operated outside the susceptible CUI temperature range, CUI may still occur such as on dead-leg line. A stagnant flow on dead-leg line generates a thermal gradient compared to its main stream and this condition shifts the temperature into susceptible CUI range, especially in carbon steel pipe. This issue, together with selection on critical point to be inspected will be discussed in the paper. They will govern the success of inspection and improvement program.

Keywords:

CUI, Dead-leg, Corrosion, Inspection, Piping System

Comparison of Pitting Corrosion Resistance of Austenitic Stainless Steel 304L And 316L Exposed to Aqueous Sodium Chloride Solution

Andi Rustandi[1*], Nurradityatama[1], M. Faisal Rendi[1], Suganta Setiawan[2]

[1]*Metallurgy and Material Engineering, Universitas Indonesia, Depok- Indonesia*
[2]*PT. Voestalpine Bohler Welding Asia Pacific, Cikarang, Bekasi- Indonesia*

Corrosion behavior of austenitic stainless steels 304L and 316L types in various concentrations of aqueous sodium chloride solutions were investigated related to its pitting corrosion resistance. Experimental testing was carried out by using cyclic polarization method at room temperature (27oC) to evaluate its corrosion mechanism. Aqueous sodium chloride solutions were prepared with various concentration, namely 1%, 2%, 3.5%, 4% and 5% NaCl. The testing results were represented by cyclic potentiodynamic polarization curves for both alloys which showed potentials that indicated the onset of breakdown potential Eb and protection potential Ep respectively. The results were influenced by sodium chloride concentrations and the chemical composition of alloys. Rank of the values of Eb and Ep for 304L and 316L at various sodium chloride concentrations from the highest to the lowest were 1%, 2%, 5%, 4%, 3.5% NaCl consecutively. It was observed that the lowest corrosion resistance of both alloys was at 3.5% NaCl which is similar to typical seawater environment with maximum dissolved oxygen solubility. It was shown that 316L has more positive potentials for both Eb and Ep as well as its difference values compared to 304L at all concentrations of aqueous sodium chloride solution.

Keywords:

Austenitic Stainless Steel, Corrosion Behavior, Pitting Corrosion Resistance, NaCl Aqueous Solution, Cyclic Polarization

MAT4 - 4

Development of Al-5Zn-Si as a Low Voltage Sacrificial Anode

Deni Ferdiana, Yudha Pratesa[1], Ahmad Angga Utama[1]

[1]*Universitas Indonesia, Department of Metallurgy and Materials Engineering, Depok 16424, Indonesia*

A sacrificial anode is a common approach for material protection in sea water application or the remote area. This method has simple installation, and low cost of maintenance compare to others. Aluminum – Zinc – Indium (Al-Zn) alloy is the common sacrificial anode that already widely applied. Nevertheless, there are reports for stress corrosion cracking cases as an effect of overprotection using this alloy. In this research, the indium substituted with silicon as the alloying element with silicon composition 0.5% and 1% weight. This alloy was produced through casting methods. As-cast product was characterized by cyclic polarization for the corrosion behavior while the microstructure was analyzed using Scanning Electron Microscope, Energy Dispersive Spectroscopy, and metallography. The result showed the silicon increased the corrosion rate of Aluminum Zinc (Al-Zn) and reduced potential protection of the alloy in high strength steel. Moreover, an observation also showed iron-rich intermetallic phase was formed at the grain boundary and creating micro galvanic corrosion with the matrix.

Keywords:

Aluminum Alloy, Corrosion, Low Voltage, Sacrificial Anode

MAT4 - 5

Predicting Models of CO_2 Materials Piping/Pipeline for Initiation Step-PERTAMINA'S CO_2 EOR Programs: Field Data, Software Simulation and Laboratory

Harris Prabowo[1,2,a,b], Johny W Soedarsono[2], Badrul Munir[2], Andi Rustandi[2], Yudha Pratesa[2]

[1]*Pertamina UTC*
[2]*Departemen Teknik Metalurgi & Material Faculty of Engineering Universitas Indonesia*
[a]*h_prabowo@pertamina.com*, [b]*harrisprabowo90@gmail.com*

As Indonesia's national energy company fully owned by the Government of Indonesia, Pertamina is faced to oil production enhancement on brown fields, relatively low cost oil, government policy to reduce gas prices and reduction of CO_2 gasses emission. Field development issues and production operation tend to set course to a condition of which the oil/gas wells have the tendency to carry relatively high impurities components (CO_2, H_2S, chloride ions) that results in early corrosion occurrence, creating damages that can start from underground equipment (casing, tubing, and packer) then leads to production facilitation on ground, which are well head, flowline, header manifold and also into gas processing plant.

Pertamina CO_2 EOR program is part of a program planned increasing production based on data from the Ministry of Energy & Mineral Resources of the Republic of Indonesia that the potential pilot project is Jatibarang Field in West Java with 0.09 TSCF potential gas reserves, oil is 49.3 MMSTB and $\pm$ 23% CO_2 content. Given the impact caused by the CO_2 component and the possibility of other components such as H_2S and chloride ions (Cl^-), therefore, this paper will lead to the possibility of material damage and the risk of corrosion of the material selection options in the PERTAMINA program plan.

Predicting model of material method is for initiation phase proposal by the evaluation of closest field data/literature review, simulation software, material and fluid analysis test and corrosion resistance test on the test sample and Materials Duplex 22Cr-15 Cr. The output of predictive models is to forecast corrosion allowance for new design and predict will be able to extend the life of the operating performance of production equipment, the requirements of HSSE (Health Safety Security and Environment) and to optimize the investment costs (Capex) and operating costs (Opex) on the next selection phase.

Keywords:

Predicting Models, CO_2 Corrosion, CO_2 Materials, CO_2 EOR

MAT4 - 6

Corrosion Evaluation of Heart Recovery Steam Generator Superheater Tube in Two Methods of Testing: Tafel Polarization and Electrochemical Impedance Spectroscopy (EIS)

Rio Pudjidarma Santoso[1], Rini Riastuti[1]

[1]*Departement of Metallurgy and Materials Engineering - University of Indonesia, Depok City 16424, Indonesia*

The purpose of this research is to evaluate the corrosion process which occurs on the water side of Heat Recovery Steam Generator (HRSG) superheater tube. The tube was $_{13}$CrMo$_{44}$ and divided into 3 types of specimen: new tube, used tube (with oxide layer on surface), cleaned-used tube (without oxide layer on surface). The evaluation of corrosion parameters was perfomed using deaerated ultra-high purity water (boiler feed water) in two methods of testing: Tafel polarization and Electrochemical Impedance Spectroscopy (EIS). Tafel polarization was excellent as its capablity to show the value of corrosion current and the corrosion rate explicitly, on the other hand, EIS was excellent as its capability to explain for corrosion mechanism on metal interface in detail. Both methods showed that the increase of electrolyte temperature from 25^{o}C to 55^{o}C would increase the corrosion rate with the mechanism of decreasing polarization resistance due to thinning out the passive film thickness and enlarge the area of reduction reaction of cathode. Magnetite oxide scale which is laid on the surface of used tube specimen shows protective nature to reduce the corrosion rate, and clear up this oxide would increase the corrosion rate back as new tube.

Keywords:

Electrochemical Impedance Spectroscopy, Magnetite Oxide, Tafel Polarization, $_{13}$CrMo$_{44}$ Tube Material

The Effect of Local Coal and Smelting Sponge Iron Basicity on Recovery of Iron

Soesaptri Oediyani[1], Paramitha Juwita Sari[1], Djoko Hadi P.[2,a*]

[1]*Metallurgical Engineering Department, Faculty of Engineering, Sultan Ageng Tirtayasa University, Cilegon 42435, Indonesia*

[2]*Badan Tenaga Atom Nasional, Bandung 40112, Indonesia*

[a] *s_oediyani@untirta.ac.id*

The new regulation on mineral resources was announced by Ministry of Energy and Mineral resources (ESDM) of Indonesia at 2014 which it called Permen ESDM No 1/2014. Therefore, this research was conducted to add the value of local iron ores by using smelting technology. The objective of the research is to produce pig iron that meet the requirement of the new regulation of mineral resources such as 90% Fe. First, iron ores and coal mixed together with lime as a flux, then smelted in a Electric Arc Furnace at 1800oC. The process variables are basicity (1; 1,25; 1,5 ; 1,75 ; 2,0) and the composition of coal (0,8%, 1,6%, 3,0%). The type of coal that used in this research was bituminous coal from Kalimantan and also the iron ores from Kalimantan. The products of the smelting technology are Pig iron and slag. Both pig iron and slag then analyzed by SEM-EDS to measure the iron content. The result shows that the maximum iron content on pig iron is about 95,04% meanwhile the minimum iron content on slag is about 3,66%. This result achieved at 1,6% coal and 2,0 basicity.

Keywords:

Basicity, Mineral Resources, Pig Iron, Slag, Smelting Technology

A Preliminary Study on the Reduction of Limonite Ore by Using Rice Husk as a Reducing Agent

Ahmad Maksum[1,2], Michael Kelvin E. Husein[1], Sulaksana Permana[1], Andi Rustandi[1], Johny Wahyuadi Soedarsono[1*]

[1]*Center of Minerals Processing and Corrosion Research, Department of Metallurgical and Materials Engineering,Universitas Indonesia, Depok 16424, Indonesia*
[2]*Department of Mechanical Engineering, Politeknik Negeri Jakarta, Depok 16425, Indonesia*

The abundant of rice husk in Indonesia has encouraged researchers to study the feasibility of rice husk for substituting material that is more expensive or dangerous. In previous study, silica with a purity of 99.9% has been obtained from rice husk with calcinations process. Nevertheless, the gases resulting from the process were not used and left useless. Therefore, in this study, those gases derived from rice husk calcinations process were used as reducing agents during the ferronickel (Fe-Ni) production through a direct reduction process. The objective of this study was to investigate the effect of the amount of rice husk in the pellets on the increase of nickel content in the limonite reduction process. The limonite ore were crushed to the size of less than 150 mesh using disc-mill, and then were mixed with rice husk powder (10, 20, 30 in wt % mass) before being pelletized using bentonite as a binder. The resulted pellets were roasted at 500°C for 60 minutes and then quenched in water media. After drying process, the reduction process of 40g pellets was conducted at 1000°C for 90 minutes with 20g rice husk in furnace. The effects of additional rice husk on the direct reduction of limonite ore pellets were qualitatively analyzed by using X-ray powder diffraction (XRD) and quantitatively by Atomic absorption spectroscopy (AAS). Both analysis results showed that the reduction process followed the reaction scheme: Fe2O3→Fe3O4→FeO and NiO phase was detected in the sample with 20% rice husk addition. The optimum concentration of Ni 1.23% was obtained for 20% rice husk addition.

Keywords:

Direct Reduction, Ferronickel, Limonite, Quenching, Rice Husk

MAT5A - 3

Upgrading Tantalum and Niobium Oxides Content in Bangka Tin Slag with Double Leaching

Sulaksana Permana[1], Jonathan Kriswanto Hutauruk[1], Ryand Adhyputra[1], Johny Wahyuadi Soedarsono[1], Andi Rustandi[1], Ahmad Maksum[1,2], Kurnia Setiawan Widana[3], Kurnia Trinopiawan[3] and M. Anggraini[3]

[1]*Center of Minerals Processing and Corrosion Research, Department of Metallurgical and Materials Engineering,Universitas Indonesia, Depok 16424, Indonesia*
[2]*Department of Mechanical Engineering, Politeknik Negeri Jakarta, Depok 16425, Indonesia*
[3]*Nuclear Energy Agency Indonesia, Pasar Jum'at, Jakarta 12440, Indonesia*

Tantalum has become one of the 14 types of critical materials where the level of its availability is assumed as the midterm critical metal. Benefits of the element tantalum in the electronics field increased the deficit balance of supply / demand, as more variations of electronic products developed. The tantalum experts calculated the level of availability until 2020. Base on the previous studies, tin slag is a secondary source of tantalum and niobium. This study uses tin slag from Bangka, Indonesia, abbreviated, Bangka Tin Slag (BTS). BTS was roasted, water quenched and sieved, abbreviated BTS-RQS.BTS was roasted, water quenched and sieved, abbreviated BTS-RQS.BTS-RQS was roasted at a temperature 700°C given sample code BTS-R700QS, while roasted at 800°C given sample code BTS-R800QS.A variable leaching experiment on BTS-R700QS was solvent concentration variable and on BTS-R800QS was time variable. The entire residue was characterized by X-Ray Fluorescence (XRF), and the optimum results are on the BTSR800QS leaching into 5 M NaOH for 20 min followed by 5M HCl for 50 min, with content of Ta2O5 and Nb2O51.56% and 1.11%, respectively. The result of XRF measurement showed was the increasing of TNO content due to the increasing solvent concentration and time of acid leaching. The discussion of thermodynamics this study used was HSC Chemistry 6 as a supporting data.

Keywords:

Bangka Tin Slag, Leaching, Niobium Pentoxide, Tantalum Pentoxide, X-Ray Fluorescence

MAT5A - 4

Nickel Recovery from Hydrocracking Spent Catalyst Using Acetic Acid: Leaching Performance and Kinetics Study

Himawan Tri Bayu Murti Petrus[1*], Andreas Diga Pratama Putera[1] , Arini Muthiah Rosmaya Putri[1], Yosua Pangihutan Sihotang[1], Widi Astuti[2]

[1]*Center of Advanced Material and Sustainable Mineral Processing, Department of Chemical Engineering, Universitas Gadjah Mada, Jl. Grafika 2, Yogyakarta 55281, Indonesia.*
[2]*Research and Development Division for Mineral Technology – Indonesian Institute of Sciences, Jl. Ir. Sutami Km. 15 Tanjung Bintang, Lampung Selatan, Lampung, Indonesia.*
Contact person: bayupetrus@ugm.ac.id

Hydroprocessing technology has been used widely and its capacity is increasing nowadays. Metal catalysts, namely nickel (Ni), are used intensively in Indonesia. Often, the spent catalysts are treated in landfill method which is not economically beneficial and requires large processing area. Moreover, the heavy metal, particularly Ni, is proven to be harmful to the soil environment and so, spent catalyst recycling process is necessary. In this work, hydrometallurgy process was used and the hydrocracking spent catalyst was leached in acetic acid solution. The effect of time, acetic acid concentration, and temperature, on the results are observed. The spent catalyst was roasted in a muffle furnace at 200°C for 30 minutes and 525°C for 120 minutes to remove its carbon content. The roasted spent catalyst is analyzed by Energi-dispersive X-ray Spectroscopy (EDX) to find out its constituents. After roasting process, the spent catalyst was sieved to get the desired size of -60 and +200 mesh. The leaching process was conducted in a shaker water bath at three different acid concentration and temperature, that are 0.1, 1.0, 4.0 N, and 30, 60, and 90°C. The observed time of leaching in this work is in 5, 15, 30, 60, and 120 minutes. In each measured time, suspensions were taken and stored. The samples are then centrifuged at 1,000 rpm for 10 minutes and the solutions are analyzed using AAS (Atomic Absorption Spectroscopy). The results show that the temperature affects the rate of the leaching process. After 5 minutes, the samples which are leached in the temperature of 60°C and 90°C show a sloping trend of nickel leached in the solution, showing that the equilibrium was reached. On the contrary, the sample that is treated at 30°C shows a steady inclining trend of leached nickel in the overall process, in the absence of a sloping trend. In addition, acid concentration significantly determines the maximum leached nickel in the sample. Higher acid concentration yields more leached nickel.

Keywords:

Environment, Spent Catalyst, Hydrometallurgy, Acetic Acid, Nickel Recovery

MAT5A - 5

Risk-Based Approach for Remaining Useful Life (RUL) Assessment of LNG/LPG Tanks Badak LNG

Vicky Indrafusa[1,a]

[1]*Corrosion and Material Engineer*
Technical Department, PT Badak NGL
Bontang 75324, Kalimantan Timur, Indonesia
[a]*indrafusa@badaklng.co.id*

Currently, Badak LNG operates 5 LNG Tanks and 4 LPG Tanks to maintain LNG/LPG inventory in Badak LNG Plant. Those tanks have reached 30 years service life. Therefore comprehensive remaining useful life (RUL) assessment of LNG/LPG Tanks is required to estimate equipment's life period within a safe and reliable condition. Direct assessment of internal LNG/LPG Tank will give useful information regarding the actual condition, but this activity is hardly performed due to operational limitation. Therefore RUL assessment of LNG/LPG tanks was performed using Risk Based Inspection (RBI) approach by reviewing design and operating conditions as well as inspection and maintenance history. Besides the risk and RUL, inspection and maintenance strategies for life extension purposes will be recommended from this assessment. Based on the assessment result, the bottom part of the tank has the highest risk of failure due to product side and soil side corrosion. The risk level of the tank can be reduced by 48.06% for LNG tank and 70.97% for LPG tank in 2026 by performing recommended inspection. All subjected LNG/LPG Tanks have remaining useful lives over 20 years.

Keywords:

Tank, Remaining Useful Life (RUL), Inspection, Risk-Based Inspection (RBI)

MAT5A - 6

Remaining Life Assessment of Fiber Reinforced Plastic (FRP) Pipe in LNG Plant After 20 Years in Operation

Luthfi Ardiansyah[1,a]

[1]*Inspection Engineer, Technical Department, PT Badak NGL*
Bontang 75324, Indonesia
[a]*luthfi@badaklng.co.id*

Fiber Reinforced Plastic (FRP) pipe has been utilized as one of the important part in Oil and Gas Industry including in LNG Production Facilities. Its ability to withstand corrosive fluids and good mechanical properties make the FRP pipe become an option in LNG Plant as cooling water distribution facilities. However, delamination and aging degradation has become big issue in FRP Pipe utilization. Proper method should be applied to assess the reliability and integrity of FRP Pipe facilities especially after reaching lifetime design in operation. One of promising method for this assessment is the Remaining Life Assessment method. This method was applied to one of PT Badak NGL's Process Train (Train G) which has already reached its 20 years' design life. A sample of FRP pipe was taken from 16 inch cooling water outlet of Propane Desuperheater Heat Exchanger, considered as the most critical location with the highest vibration level and minimum remaining thickness. Several analysis methods were carried out to ascertain the actual condition, such as visual analysis, size dimension measurement, and NDT analysis. Pipe characterizations were assessed by using flexural test, tensile test, and hardness test. Creep test has also been conducted to determine the remaining lifetime which is based on time-temperatures superposition principle. Those comprehensive observations are used to determine the estimation whether the FRP Pipe can be used properly for another 20 years. Moreover, there are some inspection programs already obtained after the assessment. Those programs were addressed as the strategic plan to sustain LNG plant operation.

Keywords:

Remaining Life Assessment, Fiber Reinforced Plastics, LNG Plant, Process Train

Thermal Conductivity Carbon/Basalt Fibers Reinforced Epoxy Hybrid Composites

I.D.G Ary Subagia[1,a*], I Ketut Gede Sugita[1], I Ketut Gede Wirawan[1], Ni Made Dwidiani[1], Ahmad Herman Yuwono[2]

[1]*Mechanical Engineering, Faculty of Engineering, Udayana University (UNUD), Kampus Bukit Jimbaran, Badung-Bali (80362)-Indonesia*
[2]*Department of Metallurgical and Materials Engineering, Faculty of Engineering Universities Indonesia, Depok-west Java 16424,Indonesia*
[a]*arsubmt@me.unud.ac.id*

The purpose of this paper is to study thermal conductivity of carbon/basalt fibers reinforced hybrid composite structures based on stacking sequence. The paper also study thermal impedance of carbon fiber reinforced polymer (CFRP) and Basalt fiber reinforced polymer (BFRP) with increased thickness. Hybrid composite was processed by using injection molding. The weight ratios fibers to polymers is 60%: 40%. This test was conducted using ASTM D5470 standard. The results showed that the stacking sequences of carbon/basalt fibers have significant impact on thermal conductivity. Hybrid composite with stacking sequence mode C3B4C3 has the lowest thermal conductivity of 0.187 W/mK and the highest thermal impedance of 0.0052 m2K/W. The highest thermal impedance of BFRP is at 0.007m2K / W with 2.5mm thickness. In CFRP the highest thermal impedance is achieve by 3.4 mm thickness with 0.005 m 2K / W. Therefore, carbon/basalt/epoxy hybrid composites is a good insulators as the thermal conductivity is smaller than 0.42 W/m ^{o}K standard.

Keywords:

Thermal Conductivity, Thermal Impedance, Hybrid Composite, Stacking Sequence, Isolation

The Tensile Strength of Mechanical Joint Prototype of Lontar Fiber Composite

Jefri Bale[1,a,b*], Dominggus G.H. Adoe[1], Kristomus Boimau[1], Thomas Sakera[1]

[1]*Department of Mechanical Engineering, Universitas Nusa Cendana, 85001 Kupang, NTT, Indonesia*
[a]*jefri_bale@staf.undana.ac.id,* [b]*jefri_bale@yahoo.com*

In the present study, an experimental activity has been programmed to investigate the effect of joint prototype configuration on tensile strength of lontar (Borassus Flabellifer) fiber composite. To do so, a series of tests were conducted to establish the tensile strength of different joint prototype configuration specimen of lontar fiber composite. In addition, post observation of macroscope was used to map damage behavior. The analysis of lontar fiber composite is a challenge since the material has limited information than others natural fiber composites materials. The results shown that, under static tensile loading, the tensile strength of 13 MPa produced by single lap joint of lontar fiber composite is highest compare to 11 MPa of tensile strength generated by step lap joint and double lap joint where produced the lowest tensile strength of 6 MPa. It is concluded that the differences of tensile strength depend on the geometric dimensions of the cross-sectional area and stress distribution of each joint prototype configuration.

Keywords:

Lontar Fiber, Joint Configuration, Tensile Strength

MAT5B - 3

Synthesis and Characterization Chitosan/ Alginate/Geothermal Silica Scaffold

Fiska Yohana Purwaningtyas[1],Yuni Kusumastuti[1,2*], Himawan Tri Bayu Murti Petrus[1,2], Budhijanto[1]

[1]*Department of Chemical Engineering Universitas Gadjah Mada, Yogyakarta 55281, Indonesia*
[b]*Center for Advanced Material and Mineral Processing CAMMP, Department of Chemical Engineering Universitas Gadjah Mada, Yogyakarta 55281, Indonesia*

Scaffold has an essential role to facilitate the repair of bone injury or disease. Chitosan and alginate are the two most commonly used natural polymers for scaffold material. Despite its recognizable role in tissue engineering, chitosan/alginate scaffold was known to possess low mechanical properties. Hence, an effort was taken to improve the mechanical properties of chitosan-alginate scaffold by silica addition. Geothermal silica refers to silica with 50% amorphous silica content that obtained as the solid waste of Geothermal Power Plant. Geothermal silica was purified using sol-gel methods to obtain silica with 97.23% purity prior to use. In this study, the lyophilized technique had been used to fabricate chitosan/alginate and chitosan/alginate/geothermal silica scaffold. Swelling ratio, mechanical strength, and pore size of scaffolds were investigated in order to observe the effect of geothermal silica addition. Furthermore, SEM analysis was conducted on the prepared scaffolds to characterize their morphology. From the experiment results, addition of geothermal silica was found to increase mechanical strength of scaffold and control its swelling ability. The highest mechanical strength value was achieved by chitosan/alginate/geothermal silica scaffold with raw materials ratio of 1:1:1. In addition, chitosan/alginate scaffold exhibits higher swelling ratio than chitosan/alginate/geothermal silica scaffold. This correlation could be explained by the presence of interconnected pores in scaffold with silica addition shown by SEM results. The interconnected pores have the essential role to increase cell infiltration and nutrients absorption for cell growth. In conclusion, geothermal silica exhibited great potential as scaffold material for biomaterial application.

Keywords:

Scaffold, Chitosan, Alginate, Geothermal Silica

MAT5B - 4

Formation and Particle Growth of TiO2 in Silica Xerogel Glass Ceramic during a Sintering Process

H Aripin[1,a], I Made Joni[2], Seitaro Mitsudo[3], I Nyoman Sudiana[4], Edvin Priatna[1], Nundang Busaeri[1], Svilen Sabchevski[5]

[1]*Department of Electrical Engineering, Faculty of Engineering, Siliwangi University, Tasikmalaya, Indonesia*
[2]*Nano Technology and Graphene Research Center (NTGRC), Padjadjaran University, Bandung, Indonesia*
[3]*Research Center for Development of Far Infrared Region (FIR Center), University of Fukui, Fukui, Japan*
[4]*Department of Physics, Faculty of Mathematics and Natural Sciences, University of Haluoleo, Kendari, Indonesia*
[5]*Lab. Plasma Physics and Engineering, Institute of Electronics of the Bulgarian Academy of Sciences, Bulgaria.*
[a]*aripin@unsil.ac.id*

In this investigation, we present the synthesis procedure and the results of an investigation of the crystallite growth of TiO2 and formation of Si–O–Ti bonds in novel silica xerogel (SiO2) glass ceramic produced from an amorphous SX derived from sago waste ash. The composition had been prepared by adding from 20 wt% to 80 wt% amount of TiO2 into the amorphous SiO2, and then a series of samples has been sintered at 1200oC for 2 hours. The influence of the content of TiO2 and the sintering temperature on the properties of TiO2, namely crystallite size and formation of Si–O–Ti has been studied in detail. The properties of the produced ceramics have been characterized on the basis of the experimental data obtained using X-ray diffraction (XRD), and Fourier transforms infrared (FTIR) spectroscopy. It has been found that an addition of SiO2 confers an appreciable effect on the quantity of Si–O–Ti bonds. The interpretation of the XRD pattern allows one to explain the increase in the crystallite size of rutile TiO2 by a decreased quantity of Si–O–Ti bonds.

Keywords:

Silica Xerogel, TiO2, Composite of SiO2/TiO2, Crystallite Size, Si–O–Ti Bond, Rutile TiO2

MAT5B - 5

Bond-Slip Behavior of Steel Bar Embedded in Lightweight Concrete Using Sand Coated Polypropylene Coarse Aggregate

Gandjar Pamudji[1,2], Bimasena Heribowo[1], Adam Yuta Prayoga[1], Heru Purnomo[1*]

[1]*Civil Engineering Department, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Civil Engineering Department, Universitas Jenderal Soedirman, Purwokerto 53122, Indonesia*

Plastic waste as coarse aggregates in concrete making is part of efforts to reduce environmental pollution. In one hand the use of plastic as aggregates can provide lighter weight of concrete than those using natural aggregates. Accordingly, a comprehensive experimental study on the concrete-steel bond behavior of structural waste polypropylene (PP) lightweight coarse aggregate concrete (WPPLAC) was carried out using different composition, aggregate gradation, type of bar and size diameter of bar. Pull out tests are conducted for three kind of plain and deformed steel bars having diameter 10, 12 and 16 mm respectively, which are embedded in concrete cubes made by the two mixtures to know local bond-slip relation. Two mixtures of sand coated polypropylene (PP) coarse plastic aggregates, sand as fine aggregates, water and Portland Composite Cement with a water-cement ratio of 0.264 are conducted. The first mixture contains 100% of 25 mm sand coated coarse aggregate while the second mixture contains 70% of 25 mm and 30% of 20 mm sand coated coarse aggregates. Bond strength versus steel displacements results in general show that higher bond strength is found for steel bar having larger diameter while steel displacements approximately follow the scale of bar diameter.

Keywords:

Plastic Coarse Aggregate, Compressive Strength, Polypropylene, Sand Coating, Bond-Slip Behavior, Plain and Deformed Steel Bar

MAT5B - 6

Utilization of Fly Ash and Nickel Slag PT ANTAM as Material Substitution for Concrete

Musnajam[1], Vita Astini[1], Fachryano[1]

[1]*Science and Technology Faculty, University of Sembilanbelas November Kolaka*

The use of concrete for road and bridge work has long been used, and nearly 80% of the bridge elements made of concrete. In concrete, aggregates it self-occupies 70% to 75% of the volume of concrete, so the quality of aggregates influence on the properties of concrete. High demand for concrete also increases demand for aggregates. As a result of the increased demand for aggregates, exploration of natural materials would potentially harm the environment. In addition, as fuel prices increase, resulting in increasing prices of construction materials and other basic commodities. Because of that, many industries switched to using coal as an alternative fuel. PT. Antam as one of the nickel mining industry also used coal as an alternative fuel. The result of using coal as fuel is the production of residual waste coal that is fly ash. The nickel production also produces nickel slag as residual waste that contains very small amount of nickel and not economically to recovered. To reduce by-product of nickel mining industry, a research use of fly ash and nickel slag as a substitution material for concrete rigid pavement was investigated. The purpose of this research, to characterized the chemical and physical fly ash and nickel slag properties. The last step of this research is the analysis of the effects of the use fly ash and nickel slag on the compressive strength of concrete as the main indicator of the strength of concrete.

Keywords:

Mine Waste, Fly Ash, Nickel Slag, Concrete Compressive Strength

MAT5B - 7

Preparation of Fe_3O_4/Bentonite Nanocomposite from Natural Iron Sand by Co-Precipitation Method for Adsorbents Materials

Perdamean Sebayang[1,2*], Candra Kurniawan[1], Didik Aryanto[1], Eko Arief Setiadi[1], Konni Tamba[3], Djuhana[2], and Toto Sudiro[1]

[1]*Research Center for Physics – Lembaga Ilmu Pengetahuan Indonesia, Bld. 440-442 Puspiptek Office Area, Tangerang Selatan 15314, Indonesia*

[2]*Departement of Mechanical Engineering, Universitas Pamulang, Jl. Surya Kencana No. 1, Tangerang Selatan 15417, Indonesia*

[3]*Department of Physics, Universitas Negeri Medan, Jl. W. Iskandar Pasar V Medan Estate, Medan 20221, Indonesia*

An adsorption method is one of the effective ways to filter the heavy metals wastes in aqueous system. In this paper, the Fe3O4 /bentonite nanocomposites were successfully prepared from natural iron sand by co-precipitation method. The chemical process was carried out by dissolving and hot stirring the milled iron sand and bentonite in acid solution and precipitating it by NH4OH. The sediment was then washed using distilled water to neutralize pH and dried at 100 °C for 5 hours to produce Fe3O4 /bentonite powders. The samples were characterized by XRD, FTIR, BET, TEM, VSM and AAS. All samples were composed by Fe3O4 single phase with a spinnel structure and lattice parameter of 8.373 Å. The transmittance peak of FTIR curve proved that the Fe3O4 particles and bentonite had a molecular bonding. The addition of bentonite to Fe3O4 nanoparticles generally reduced the magnetic properties of Fe3O4 /bentonite nanocomposites. The optimum condition of 30 wt% bentonite resulted 105.9 m2 /g in surface area, 14 nm in an average particle size and 3.2 nm in pore size. It can be used as Cu and Pb adsorbent materials.

Keywords:

Iron Sand, Fe_3O_4, Bentonite, Co-Precipitation, Nanocomposite, Adsorbent Materials

MAT6 - 1

Raman Spectroscopy Study, Magnetic and Microwave Absorbing Properties of Modified Barium Strontium Monoferrite Ba(1-x)Sr(x)Fe2O4

Ade Mulyawan[1*], Wisnu Ari Adi[1], Salim Mustofa[1], Yunasfi[1]

[1]*Center for Science and Tecnhnology of Advanced Materials (PSTBM), National Nuclear Energy Agency of Indonesia (BATAN), Indonesia*

In the contrary to other common AFe2O4 ferrites, Barium Monoferrite (BaFe2O4) have a bit more complex structure which exhibits orthorhombic structure. This structure permits to substitute Ba2+ with another divalent ion metals such as Strontium (Sr2+) to improve the magnetic and microwave absorbing property. In this study, Barium Strontium Monoferrite in the form of Ba(1-x)Sr(x)Fe2O4 (0.0 x 0.5) has been successfully fabricated using high energy milling technique. Fine nanoparticle powder was characterized by using X-ray diffractometer, Raman spectroscopy, Vibrating sampel magnetometer (VSM), and Vector network analyzer (VNA). In the composition of x=0 and 0.1, All of the Raman spectra peaks were confirmed and matched with Raman Active Modes of BaFe2O4 Orthorhombic structure with Space Group Cmc21 and Point Group C2v (mm2) which correspond to the single phase of BaFe2O4. In the composition of x=0.3, the highest-frequency Raman active mode was still unaffected by the Sr2+ substitution whereas the lower-frequency Raman active mode were clearly changed due to the overload distortion of the Sr2+, the highest frequency Raman active mode were totally changed in the composition of x=0.5. Referring to the M-H curves, it was known that all of the compositions have a strong ferromagnetic behavior with largest coercive force of 3285 Oe was obtained in the composition of x=0.1. It also exhibited a significant microwave absorbing property which the value of the reflection loss reached -38.25 dB (~99.9%) in the range of 11.2 GHz.

Keywords:

Barium Monoferrite, Strontium Modification, Raman Spectroscopy, Magnetic Properties, Microwave Absorbing Properties

MAT6 - 2

Effect of Structural Transition on Magnetic Properties of Ba-Doped $LaMnO_3$ Nanopowders Characterized by Raman Spectroscopy

Salim Mustofa[1], Wisnu Ari Adi[1], Anton Prasetyo[2], Veinardi Suendo[3], and A. A. Nugroho[4]

[1]*Center for Science and Technology of Advanced Materials (PSTBM) – BATAN, Kawasan Puspiptek Serpong, Tangerang Selatan 15314, Indonesia*

[2]*Department of Chemistry, Maulana Malik Ibrahim State Islamic University, Jl. Gajayana 50, Malang 65144, Indonesia*

[3]*Research Center For Nanosciences and Nanotechnology, Bandung Institute of Technology, Jl. Ganesha 10, Bandung 40132, Indonesia*

[4]*Physics of Magnetism & Photonic Research Div., Fac. Mathematics & Natural Sci., Bandung Institute of Technology, Jl. Ganesha 10, Bandung 40132, Indonesia*

Lanthanum-based perovskite, Lanthanum Manganite ($LaMnO_3$) nanopowders doped with Ba^{2+} from Barium Carbonate ($BaCO_3$) were synthesized by solid-state reaction method. The mixture of materials was milled for 10h and then sintered at temperature of 1000^{o}C for 10h. Dependence of structural and magnetic properties on Ba^{2+} content is investigated by Raman Spectroscopy and vibrating sample magnetometer (VSM). The Raman spectra from $LaMnO_3$ without doping of Ba is closely resemble to rhombohedral $LaMnO_3$ at room temperature, showing peaks around 217, 321, 431, 494 and 616 cm^{-1}. The peaks around 500 and 600 cm^{-1} are consistent with other studies, being usually ascribed to bending (B) and stretching (S) modes of the MnO_6 octahedron, respectively. The bands of Ba doped LaMnO3 sample are located at: 271, 414, 566 and 643 cm^{-1}, respectively. The band located at 271 cm^{-1} is associated with the oscillations out of phase MnO6 octahedron. The band located around 643 cm^{-1} involves expansion processes and contraction in the basal oxygen phase, producing a stretching and compression of the Mn-O bonds in the plane zx of an octahedron structure. It means that the substitution of Ba has resulted in structural transition from rhombohedral symmetry (space group R3c) to orthorhombic (Pbnm) as indicated by Raman spectra analysis. Suppression, sharpening, and shifting of Raman modes have been observed with further increase in Ba concentration. The hysteresis of LaMnO3 at R.T. has a linear magnetic pattern on the function of the applied magnetic field H, which means exhibit the characteristic property of paramagnetic materials. While the Ba-doped Lanthanum Manganite perovskite exhibit the property of ferromagnetic material, which depend on the presence of mixed-valence Mn ion through double-exchange mechanism due to the presence of Lanthanum and Barium in the perovskite system, which is shown by the Raman spectra around 643 cm^{-1}. Substitution with Ba significantly enhances the remnant magnetization due to the broken spin structure caused by the distortion in the crystal lattice. The hysteresis of Ba-doped LaMnO3 perovskite at R.T. has not a linear magnetic pattern on the function of the applied magnetic field H.

Keywords:

Nanopowder, Lanthanum-Based Perovskite, Ba-Doped, $LaMnO_3$, Doping, Raman Spectroscopy, Magnetic Property

Double Layer Microwave Absorption Characteristics of Barium Hexaferrite/Silica Composite for X-Band Frequencies

Erfan Handoko[1], Iwan Sugihartono[1], Mangasi Alion Marpaung[1], Maulana Randa[2], Mudrik Alaydrus[3] and Nofrijon Sofyan[4]

[1]*Department of Physics, Universitas Negeri Jakarta, Jalan Rawamangun Muka 13220. Jakarta Indonesia*
[2]*Balitbang Kementerian Pertahanan Republik Indonesia, Jakarta Indonesia*
[3]*Department of Electrical Engineering, Universitas Mercu Buana, Jalan Meruya Selatan No.1 Jakarta. Indonesia*
[4]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

Microwave absorption characteristics of double layer of barium hexaferrite attached on the silica to from a composite on the basis of wave propagation theory have been investigated. Barium hexaferrite, $BaFe_{12}O_{19}$, was synthesized through ceramic method from stoichiometric mixtures of $BaCO_3$ and Fe_2O_3 as precursors. The mixture was pelletized under the pressure of 10 Mpa and sintered at 1100 ^oC for 5 hours. Silica in the forms of powder was purified by using HCl. The crystal structure of the samples was characterized using X-ray diffraction (XRD), microstructure was examined using scanning electron microscope (SEM), hysteresis curves recorded by PERMAGRAPH techniques, whereas the microwave absorbing properties for X-band was recorded using a vector network analyzer (VNA). Relative complex permeability and permittivity, and reflection loss values were calculated at given thickness according to transmittance line theory within the range 8.2–12.4 GHz. Based on this study, the layer dimension and frequency that results in low reflection loss can be estimated from the material properties of the barium hexaferrite/silica composite material.

Keywords:

Barium Hexaferrite, Microwave Absorber, Radar-Absorbing Material, Reflection Loss, Silica

MAT6 - 4

Effect Plasma Power on Surfaces of SiO2 Quartz Crystal during Etching by Using CH_2FCF_3 Gas

Masruroh[1*], Mahardika Auditia Hanif [2], S. P. Sakti[1] and D.J. Djoko H. Santjojo[1]

[1]*Department of Physics, FMIPA, Brawijaya University, Malang, Indonesia*
[2]*Undergraduate School, Department of Physics, FMIPA, Brawijaya University, Malang, Indonesia*

The performance of a quartz crystal microbalance (QCM) biosensor can be enhanced by patterning the surface of the SiO^2 substrate. In this study, the patterning was realized by plasma etching process. The etching of the SiO_2 was carried out with a CH_2FCF_3 plasma. The plasma was generated by applying power from a generator. The generator used in this research was a low frequency 40 kHz plasma generator. It is equipped with automatic matching circuits, which ensure the stability of plasma power during the experiments. The specimens were produced with a power varied from 40 Watt to 120 Watt for 1 hour. The pressure of the chamber was fixed at a pressure of 1 Torr. The processing gas for this study was a commercial CH_2FCF_3 gas. The flow rate of the gas was 20 ml/min. The purposes of this research were to study the effect of the plasma power to the etching rate and the anisotropy of the etched SiO_2 surface. The etching rate and the anisotropy strongly correlate with the quality of patterning. Measurement and observation of the etched SiO_2 surface were observed with an optical microscope and a TMS-1200 (Topography Measurement System). The optical microscope was used to determine the etched area from the un-etched one. On the other hand, the TMS was utilized to obtain the thickness and the surface profile. The results show the highest etching rate i.e. 17.90 nm/min was obtained by applying a plasma power of 100 Watt. The rate relatively showed a slow etching process due to a complex mixture of fluor (F) and CH_2FCF_2 compound. This slow etching rate is preferable for controlling nano profiles of the pattern. Furthermore, the applied power also have an effect to the anisotropy of the etched profile, and the results of this research show the best anisotropic coefficient of 4.8 x 10-2 occurred in the process with an optimized 110-watt power. The anisotropy was the ratio of the vertical etching rate and the horizontal etching rate. This ratio is important in determining the quality of the profile of the patterned QCM.

Keywords:

CH_2FCF_3 Gas, Anisotropic Coefficient, Low-Frequency Generator, Etching Rate

MAT6 - 5

Effect of SiC and Sintering Temperature Variations on the Characteristic of Fe-Sheathed MgB2 Superconductor Wires

Satrio Herbirowo[1*], Hendrik[1], Pius Sebleku[a], Sergio[2], Agung Imaduddin[1], Nofrijon Sofyan[2], Akhmad Herman Yuwono[2]

[1]*Reserch Center for Metallurgy and Materials-Indonesian Institute of Sciences (P2MMLIPI), Kawasan Puspiptek,Serpong, Tangerang 15314, Indonesia*

[2]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*

MgB2 superconductor with relatively high critical temperature (Tc=40K) has been developed for possibilities utilization in various practical applications such as Magnetic Resonance Imaging. In order to enhance the process, the material was prepared by Powder-In-Tube (PIT) method, while the superconducting properties was improved by incorporating 0 wt.%, 10 wt.% and 20 wt.% SiC nanoparticles into MgB2 structure. This study aimed at analyzing the effect of sintering temperature on the microstructure, resistivity and phase of Fe-sheathed MgB2 superconducting wires. Three different compositions of MgB2 powders were inserted into Fe tube with inner ø of 4 mm and outer ø of 6 mm. This tube was then rolled and drawn into a ø 2.5 mm wire. Wire samples with three different compositions of SiC were heat treated at 600°C and 800°C respectively. All samples were characterized to analyze the morphology, resistivity and crystal structure. X-ray diffraction (XRD) analysis showed that some Mg may react with SiC to form MgSi and with oxygen to form MgO. Scanning electron microscope (SEM) images revealed that with no addition of SiC, MgB2 was formed and dispersed uniformly in wire, but with 10 wt.% and 20 wt.% SiC nanoparticles, the whisker morphology was observed resulting in degradation of the superconducting properties.

Keywords:

MgB2, Superconductor, SiC Nanoparticles, Critical Temperatures, Cryogenic

MAT6 - 6

The Effect of Various Precursors and Solvents on the Characteristics of Fluorine –Doped Tin Oxide Conducting Glass Fabricated by Ultrasonic Spray Pyrolysis

Akhmad Herman Yuwono[1,2,a*], Tri Arini[1,3], Latifa Hanum Lalasari[3], Nofrijon Sofyan[1,2], Andaradhi Nararya[1], Ghiska Ramahdita[1,2], F. Firdiyono[3], Lia Andriyah[3], Achmad Subhan[4], Chairul Hudaya[5]

[1]*Department of Metallurgical and Materials Engineering, Faculty of Engineering Universitas Indonesia, Depok-West Java, Indonesia 16424*
[2]*Tropical Renewable Energy Center (TREC), Faculty of Engineering Universitas Indonesia, Depok-West Java, Indonesia 16424*
[3]*Research Center for Metallurgy and Materials, LIPI Puspiptek Serpong, Cisauk-Banten, Indonesia 15314*
[4]*Research Center for Physics, LIPI Puspiptek Serpong, Cisauk-Banten, Indonesia 15314*
[5]*Department of Electrical Engineering, Faculty of Engineering Universitas Indonesia, Depok-West Java, Indonesia 16424*
[a]*ahyuwono@eng.ui.ac.id*

Transparent conductive oxide (TCO) films are one of the most important components in photovoltaic devices including dye-sensitized solar cell (DSSC). In addition to its high conductivity, transparency is also another important requirement must be achieved in fabricating TCO. One of the TCO films is fluorine-doped tin oxide (FTO) which can be considered as the most promising substitution for indium-doped tin oxide (ITO) since the latter is very expensive. However, the fabrication techniques for TCO film need to be carefully selected where the synthesis parameters must be properly optimized to provide the desired properties. In this work, the FTO glass has been fabricated by ultrasonic spray pyrolisis technique using different precursors, i.e. tin (II) chloride dihydrate (SnCl2.2H2O) and anhydrous tin (IV) chloride (SnCl4), and solvents, i.e. ethanol and methanol. For both condition, ammonium fluoride (NH4F) was used as the doping compound.The resulting thin films were characterized by using scanning electron microscope (SEM), x-ray diffraction (XRD), ultraviolet-visible (UV- Vis) spectroscopy and four-point probe test. The results of investigation showed that the highest transmittance of 88.3% and the lowest electrical resistivity of 8.44 x 10-5 Ω.cm were obtained with the FTO glass processed with 20 minutes of spray pyrolysis deposition time and 300oC substrate heating using SnCl4 precursor and methanol solvent. It can be concluded that TCO fabrication with tin chloride precursors and ammonium fluoride doping using ultrasonic spray pyrolisis can beconsidered as a simple and low cost method as well as a breakthrough in manufacturing conductive and transparent glass.

Keywords:

Conductive Glass, Tin (II) Chloride Dihydrate Precursor, Anhydrous Tin (IV) Chloride Precursor, Ammonium Fluoride Doping, Electrical Resistivity, Optical Transmittance

MAT6 - 7

Preparation and Characterization of Carbon Nanotube/Graphite/Zinc Oxide Composite as Supercapacitor Electrode Material

Agus Subagio[1,a], Alfin Darari[1], Istajib Sulton Hakim[1], Priyono[1], Pardoyo[1], Ahmad Subhan[2]

[1]*Departement of Chemistry, Faculty of Science and Mathematics, Diponegoro University Semarang, Indonesia*
[2]*Center of Physics Research, LIPI Serpong, Indonesia*
[a]*agus_fadhil@yahoo.com*

A simple method has been developed to prepare carbon nanotube/graphite/zinc oxide (CNT/GT/ZnO) composite on SS foil substrate which are employed for supercapacitor electrode materials. The XRD study reveals the formation of CNT/GT/ZnO structure. Scanning electron microscopy characterizations reveal that the combination of CNT/GT and ZnO can increase the conductive property of material. The electrochemical performance of composite electrode was investigated using cyclic voltammetry measurements in 1 M KCl aqueous electrolyte. The CNT/GT/ZnO composite electrode shows the specific capacitance up to 6.99 Fg−1 in scan rate of 25 mVs-1 with an energy density of 152.9 Wh kg−1 in the potential range −0.5 V to 0.5 V.

Keywords:

CNT, Graphite, ZnO, Supercapacitor, XRD, SEM, Cyclic Voltammetry

Effect of the Rare Earth Oxide Impurities on the Physical and Thermal Properties of $Ce_{1-Y}Gd_{1-X}O_{2-1}$ (GDC) Composite Electrolyte IT-SOFC's

Jarot Raharjo[1*], Damisih[1] and Masmui[1]

[1]*Center for Materials Technology, Agency for the Assessment and Application of Technology (BPPT), Building 224 Puspiptek Serpong, South Tangerang, Banten, 15314, Indonesia.*

Observation on the effects of rare earth impurities on the properties of $Ce_{1-y}Gd_{1-x}O_{2-1}$ (GDC) composite electrolyte has been performed. The dopant Gd_2O_3 was used to suppress the oxygen vacancy ordering and increase the pre-exponential factor in the system and ensured the stability and high ionic conductivity of the ceria based electrolytes material for SOFC. Indonesia has abundant rare earth elements especially CeO_2, which one of the resources is from monazite mineral. In this study, the GDC powders were synthesized via solid state technique with the composition of where x = 0.05. The two types of precursors were prepared and mixed into planetary ballmill, i.e., CeO_2 (Sigma Aldrich) with Gd_2O_3 (commercial, Sigma Aldrich) and CeO_2 (non-commercial, local product) with Gd_2O_3 (Sigma Aldrich), namely GDC commercial and GDC non-commercial, respectively. The composite electrolyte powders were calcined at temperatures 8000C in the air atmosphere condition. The composite electrolytes were then characterized in terms of its morphology, phase structure and thermal properties of the powders. The GDC commercial powders consist of face centered cubic fluorite ceria structure which was confirmed by X-Ray Diffraction (XRD). The peaks are matching well with the cerium oxide JCPDS card No: 34-394. There are no peaks detected for the gadolinium oxide. It indicates that the dopant ion is fully substituted into the CeO_2 lattice. The elemental analysis was performed using X-ray Fluorescence (XRF). The microstructures were observed under Scanning Electron Microscopy (SEM). The thermal properties characterizations were performed by using Thermal Gravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC) from room temperature to 15000C. Among the composite electrolytes investigated, the GDC commercial showed the better performance in terms of their physical and thermal properties.

Keywords:

Composite Electrolyte, GDC, Natural Resources of CeO_2, Solid Oxide Fuel Cell

QiR

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International Symposium on Industrial Engineering and Ergonomics

IE

Invited Speaker – IE1

Model Selection Within the Class of Discrete-Time Markovian Models

Marie-Anne Guerry[a] and Philippe Carette[b]

[a]*Vrije Universiteit Brussel (VUB), Department Business Technology and Operations, Pleinlaan 2, 1050 Brussels, Belgium*
[b]*Ghent University, Department of General Economics, Tweekerkenstraat 2, 9000 Ghent, Belgium*

Markovian models are useful in engineering. To obtain an accurate and tractable model for a system, alternative candidate models must be assessed and compared. The present paper formulates some guidelines in striving for a valid discrete time-homogeneous Markovian model. A first point of attention concerns the states since the validity of the model is determined by the number of states and how they are defined. A simple Markov model is characterized by a transition matrix and assumes that the states are homogeneous with respect to the one-period state transition probabilities. At the outset, longitudinal data on variables associated with possible observable sources of heterogeneity provide useful information for the selection of states. Additionally, a hidden Markov model can be constructed to deal with latent sources of heterogeneity. A second point of attention appears in modeling a system with states for which there are duration-of-stay effects. One way to deal with state transitions that depend on the sojourn time in a state, is by considering a more detailed specification of the initial state based on a length of stay criterion. However, the disadvantage of this approach is the increase in the required amount of data to estimate properly the state transition probabilities for each of the length of stay subdivisions. An alternative approach is to build a semi-Markov model that allows various distributional forms for the sojourn times. For a given data set, the different model types can be compared regarding their goodness of fit and their complexity. The computation of the Akaike's Information Criterion (AIC) or the Bayesian Information Criterion (BIC) contributes to select the best model. The present paper integrates the various points of attention in a working plan and discusses the model selection procedure in an engineering context.

Keywords:

Model Selection; Simple Markov Model; Semi-Markov Model; Hidden (Semi-)Markov Model

Designing User Interface of Mobile Application for Monitoring Children's Health and Development from User and Pediatrician Perspectives

Amalia Suzianti, Shabila Anjani, Hatara Trirama, Tesar Dayansyah and Alviana Alicia Syafinal

Laboratorium Product Development and Innovation, Departemen Teknik Industri, Fakultas Teknik,Universitas Indonesia Depok 16424, Indonesia

The quality issues of infant's health in Indonesia are reflected in the number of infant's death that are still quite high compared to other countries in ASEAN. In order to solve this problem, creating a powerful information systems is an important component in improving the quality of health services. A strong and trusted information system can be built by making a mobile app which could be a source of health information and connecting parents with the pediatrician. Methods that are used in this research are analysis of persona, card sorting, conjoint analysis, and system usability scale. The research begins by identifying problems as well as the features and sub-features, obtained through questionnaires and interviews. Based on the questionnaire results, each persona will be identified by looking at the behavior and features needed by the pediatrician on the mobile app. Open-ended question was conducted to ensure the needs of the features and the results were used as the reference in generating the information architecture and application flow diagrams. Next step, conjoint analysis method is used to find the mobile app's main page design that suits the pediatrician. Last, usability testing using Retrospective Think Aloud method. The output of this research is a mobile app that is capable of improving health care services by connecting the parents to the pediatrician and help to ease the pediatrician work.

Keywords:

Healthcare Mobile Application, Persona, Conjoint Analysis, Retrospective Think Aloud, System Usability Scale

Improving Quality and Productivity Analysis as an Effort to Development the Supporting Industries In Indonesia

Hafid Abdullah[a] dan Eddy Herjanto[b]

[a]Metal Industries Development Centre (MIDC), Ministry of Industry Indonesia
Jl. Sangkuriang No. 12 Bandung 40135 Email: hafidochan@yahoo.com
[b)] Ministry of Industry Indonesia, Jl. Jenderal Gatot Subroto Kav.52-53 Jakarta

The quality and productivity on supporting industries in Indonesia was identified low. The target of this research is to improve quality and productivity products increased as an effort to development the supporting industries to be able to complete both in domestic market an in a free market. The research method was taken, consist of: analysis of the condition of supporting industries currently that seen from the reject ratios and quality control, SWOT analysis and improved way through the implementation of the Quality Control Circle (QCC) management for continuous improvement. The analysis showed that most of the rejected ratio can be decreased to be 2% approximated 45,65%, Indonesian National Standard is less used (23.91%), which are widely applied quality system is ISO 9000:2008 (30.43%) and work instructions (30,43%). Quality improvement methods that used are QCC approximated 45.65%, benchmark (34.78%), Failure Method and Effect Analysis (17.39%), Quality Function Deployment (8.7%) and others 15.22% did not use the method. The weakness of the SWOT analysis result is that the implementation of QCC quality management system has not been optimally implemented. For examples, the implementation QCC in PT. MTM. Result of the improvement the percentage of rejected ratios spacer component is 25% (before improvement) claimed by PT. Komatsu Indonesia as its consumer (partnership) can be decreased to be 0% (after improvement).

Keywords:

QCC, 5W1H, Continuous Improvement, Supporting Industries

Leveraging Motor Cycle Driving Satisfaction Using Vehicle Operation and Maintenance Quality Improvement

Djoko Sihono Gabriel[1,a], Palito J. Endthen[1]

[1]*Department of Industrial Engineering, Universitas Indonesia, Depok Campus, Indonesia 16424*
[a]*dsihono@gmail.com, gabriel@ie.ui.ac.id*

Vehicle quality usually considered as key variable in maintaining Customer Satisfaction. Good logistic and delivery of motorcycle, spare parts as well as post purchase service quality also enhance customer satisfaction. These variables are mostly depended to overall effort of motorcycle manufacturers and their value chain: from vehicle and spare parts design, materials choice, methods and quality of manufacturing processes, products and spare parts quality control as well as service quality of authorized service and maintenance workshop. No one doubt if motor cycle producers continually invest and operate their production and maintenance facilities to ensure their products quality. But who care with motor cycle owner role? When a motor cycle bought, its operation and maintenance quality were strongly depend on the owner of the vehicle that vary in their knowledge and awareness. This research proposed Vehicle Operation and Maintenance Quality as a variable that leverage Driving Satisfaction if the owner had good knowledge and good awareness in operating as well as maintaining the vehicle. Otherwise, dissatisfaction will occur to owners who had lower knowledge and awareness. A Structural Equation Modelling with Lisrel 8.8 software used as tool of analysis in proofing of those hypothesis by identifying experience of 247 motor cycle drivers in Jakarta, Bogor, Depok, Tangerang and Bekasi. The results indicated that most of the research hypothesis were accepted, especially that Vehicle Operation and Maintenance Quality variable intervened the relationship between one of independent variables with Driving Satisfaction variable. This research concluded that the proposed intervening variable will give valuable benefit if motor cycle producers and dealers develop and maintain the variable correctly. Operation and Maintenance Quality will enhance Driving Satisfaction and the better satisfaction will create better customer loyalty and brand loyalty. A new way of customer satisfaction improvement revealed by this research and strategic efforts of motor cycle producers can be developed with a new perspective that never known before.

Keywords:

Motorcycle; Intervening Variable; Operation and Maintenance Quality; Driving Satisfaction; Structural Equation Modelling

Development of Stakeholders Role to Support Plastic Packaging Material Value Conservation Using Brain-Writing and Interpretive Process

Djoko Sihono Gabriel[1,a], Albertus Wahyu Anindityo[1]

[1]*Department of Industrial Engineering, Universitas Indonesia, Depok Campus, Indonesia 16424*
[a]*dsihono@gmail.com, gabriel@ie.ui.ac.id*

According to material value conservation paradigm every material should not be considered as marginal material, but as valuable resource which its value should be conserved. Prevention of material value by design for recycling implementation supports easier and faster processes of mechanical recycling with better products quality and improve its financial viability. Therefore it supports plastic material resource conservation schemes and reduces material waste, and also promotes a new way in environmental protection. A material value conservation implementation needs appropriate and strategic stakeholder roles in order to optimize the line of sight among stakeholders. Procedure and technique of analysis called Brain-Writing and Interpretive Process implemented in this research by interviewing competence resource persons represented of every category of stakeholder: government institutions as regulator and law enforcement agencies, plastic packaging producers, plastic packaging purchasers, plastic waste collectors, as well as plastic recyclers, and then analyzing their responds to find out the appropriate strategic role and its structure. The result of the two methods suggest a list of stakeholders with their strategic role that support material value conservation aims in context of quality and value of plastic waste improvement as well as increase of quantity of waste accepted by plastic recycler. Stakeholder role provided valuable information and its directions of implementation in managing plastic materials and plastic packaging products, as well as its post-consumer materials as valuable waste. The new paradigm which supported by appropriate role of stakeholders will generate broader impact and more benefit in optimizing plastic waste utilization, especially for region with high density of people and high consumption rate of plastic packaging products.

Keywords:

Plastic Packaging; Material Value Conservation; Stakeholder Role; Mechanical Recycling; Brain-Writing; Interpretive Process

IE1 - 5

Integration Model of Value Engineering (VE) – Lean Six Sigma (LSS) for Cost Management Program in Steelmaking Process

Widia Kurnia Adi[a], Teuku Yuri M. Zagloel[a,*] , Fauzia Dianawati[a,2]
[a]*Department of Industrial Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424*
** Corresponding author.*
E-mail address:yuri@ie.ui.ac.id

There are three main characteristics the product do be successful and accepted by customers which are functionality and quality which is internally associated with cost and externally with price, the so-called Survival Triplet. In the case of steel products, functionality and quality of product are specified in the product standard. Hence, internally cost is the only remaining characteristic that should be well managed. The implementation of Lean, Six Sigma (LSS) and Value Engineering (VE) lead to cost reduction by different approaches. The objective of the study is to test response suitability of proposed integration model of VE-LSS according to implementation of Lean, Six Sigma and VE in the steelmaking process. Integration model between VE and LSS developed by modify original VE concept (Value = Function/Cost). Integration of LSS into VE framework enhanced resource consumption efficiency that lead to lower Cost while maintaining Functionality and Quality characteristic of products. A suitability response test conducted by means of statistical variable analysis on steelmaking process operation's data which was retrieved by using Business Intelligence (BI) Matrix software. The analysis showed the implementation of VE-LSS simultaneously increase the efficiency of resource consumption in the steelmaking process that lead to lower cost. These results were in conformity with the proposed integration model of VE-LSS.

Keywords:

Integration Model; Lean Six Sigma; Survival Triplet; Steelmaking Process; Value Engineering

Incorporating SERVQUAL-QFD with Taguchi Design for Optimizing Service Quality Design

M. Arbi Hadiyat

Industrial Engineering, University of Surabaya, Indonesia

Deploying good service design in service companies has been updated issue in improving customer satisfaction, especially based on the level of service quality measured by Parasuraman's SERVQUAL. Many researchers have been proposing methods in designing the service, and some of them are based on engineering viewpoint, especially by implementing the QFD method or even using robust Taguchi method. The QFD method would found the qualitative solution by generating the "how's", while Taguchi method gives more quantitative calculation in optimizing best solution. However, incorporating both QFD and Taguchi has been done in this paper and yields better design process. The purposes of this research is to evaluate the incorporated methods by implemented it to a case study, then analyze the result and see the robustness of those methods to customer perception of service quality. Started by measuring service attributes using SERVQUAL and find the improvement with QFD, the deployment of QFD solution then generated by defining Taguchi factors levels and calculating the Signal-to-noise ratio in its orthogonal array, and optimized Taguchi response then found. A case study was given for designing service in local bank. Afterward, the service design obtained from previous analysis was then evaluated and shows that it was still meet the customer satisfaction. Incorporating QFD and Taguchi has performed well and can be adopted and developed for another research for evaluating the robustness of result.

Keywords:

SERVQUAL, Customer Gaps, QFD, Taguchi, Optimized Service Design

How Kansei Engineering, Kano And QFD Improve Logistics Services

Markus Hartono[1,a], Amelia Santoso[1], Dina Natalia Prayogo[1]

[1]*Department of Industrial Engineering, University of Surabaya, Indonesia*
[a]*markus@staff.ubaya.ac.id*

In the period of 2004 – 2014, there was a significant growth of employment in logistics sector in Indonesia. It shows that there is an opportunity to probe problems and achieve improvements in logistics sectors. Inherently, it shows a global trend, which is a rapid need for outsourcing the supporting logistics activities. It makes the logistics service provider (known as thirdparty logistics) has a beneficial portion in the international and domestic supply chain. With regard to the very tight competition, the logistics services should be able to deliver both cognitive and affective customer satisfaction. In the operational point of view, customer satisfaction and lifetime values offered are the critical attributes to the success of logistic services. Mostly, studies in logistic services have been focusing on the service gaps, which is more on cognitive process. Actually, many researches have been conducted in evaluating the logistics service quality using SERVQUAL and Kano model. However, it is relatively insufficient. Hence, a deep understanding of customer affective need (known as Kansei, in Japanese) is highly required, as a competitive advantage to explore and model more comprehensive customer experiences due to perceived certain logistics services. This paper proposes a model of Kansei Engineering, Kano and QFD, which is hoped to generate more innovative ideas for improvements. Surely, those which are critical and sensitive to the customer emotional satisfaction will be of interest. Moreover, it leads to the customer delight, which is beyond satisfaction. A case study in the supporting logistics services has been chosen to validate the proposed model. A survey through face-to-face questionnaire involved 157 customers has been done. Afterwards, the model has been validated, and through House of Quality (HoQ), it has been proposed some innovative improvement ideas. They include the use of apps for order confirmation and cancellation, the integration of Google Maps to the ordering system, pre-order booking, and the feature of bilingual in the transaction menu. Thus, in practical implication and point of view, this study is hoped to provide guideline to the manager of logistics services' company in capturing, measuring and analyzing the customer emotional need (Kansei), with respect to the service attributes which are highly significant to those Kansei.

Keywords:

Kansei Engineering, Kano, QFD, Logistics, Services

Development of Eye Fixation Points Prediction Model from Eye Tracking Data Using Neural Network

Boy Nurtjahyo Moch., Komarudin, Maulana Senjaya Susilo

Universitas Indonesia, Depok, Indonesia

With the increasing number of scientific fields using eye tracker to achieve new breakthroughs in many sectors, the fixation point as the stopping location of the respondent's eye movements indicate most likely spots of information contained in the area which was disgested much and that information can be taken into consideration for the decision making related to specific experiments. Answering this need, the authors developed a model of Neural Network using the help of MATLAB to predict the output from the process undertaken to original fixation point results of eye tracking experiment by training and testing various types of combinations of the transfer functions between layers and training functions that exist in Neural Network with the purpose of seeking a combination of functions that give the smallest MAPE (Mean Absolute Percent Error) and MSE (Mean Squared Error) value, the smallest number of training iterations, and the shortest duration of training.

Keywords:

Eye Tracking; Neural Network; MATLAB; MAPE; MSE

IE2 - 3

The Proposal of Footwear Product Improvements by Using the Methods of Six Sigma and Quality Function Deployment In PT. Primarindo Asia Infrastructure Tbk

Julian Robecca

Universitas Komputer Bandung, Fakultas Teknik dan Ilmu Komputer, Program Studi Teknik Industri
Jl. Dipati Ukur no.102-116, Bandung 40132, Indonesia
julian.robecca@email.unikom.ac.id
ivorobecca@gmail.com

Six Sigma is a holistic approach to solve the problem and process improvement through a phase of DMAIC (Define, Measure, Analyze, Improve and Control). DMAIC is the heart of Six Sigma analysis that ensures voice of the customer to run in the overall process to produce products that satisfy customers. Quality Function Deployment (QFD) is a methodology in the process of designing and developing products or services that are able to integrate the 'voices of consumers' into the designing process. Producing the products that are 100% good is not easy. This is experienced by PT Primarindo Asia Infrastructure Tbk., as the casual shoes type production company in Bandung area. Until 2016, there are still many defects which are generated. Although sigma level of Tomkins shoe production has reached level 4, the company must continue to reduce the number of defects that occur in order to raise the sigma level. The results showed that the defect types are most widely produced from four shoes models; they are the defect types of slanted lasting. Although the sigma level which is resulted already exceeds level 4, it needs improvement so that the defects number is reduced. For junior shoe model variables, what must be corrected is the shoes durability, tears on shoes, easily broken shoe eyelets, the power of adhesive glue on shoes, and slippery footwear. The improvement on shoes durability is done at the assembly aspect. The selection of good glue raw materials and glue polishing on shoe components should also be improved because it will influence the adhesive power. The improvement on slippery footwear variable is the materials selection for good footwear so the shoes does not become slippery, and the pattern on the outsole also influences the shoe grip to the ground and it is not easily slip to the users. The Methods of Six Sigma and QFD are expected to reduce the number of defects with the improvements as proposed by each method.

Keywords:

Defect, Six Sigma, Quality Function Deployment, House of Quality

Performance Measurement's Software Development for Internal Assessment Based on MBCFPE – KPKU BUMN

Sugih Arijanto[#1] , Handi Wijaya[*2] , Cahyadi Nugraha[#3]

[#] *Industrial Engineering Department, Itenas*
Jalan PHH Mustofa 23 Bandung Indonesia
[1]*sugih@itenas.ac.id*
[2]*handiwjaya@gmail.com*
[3]*cnugraha@itenas.ac.id*

This paper discusses the performance measurement's software system development to help companies in an internal assessment before taking formal assessment. The measurement system is based on Kriteria Pengukuran Kinerja Unggul - Badan Us aha Milik Negara (KPKU-BUMN, State Owned Enterprise) based on Malcolm Baldrige Criteria for Performance Excellence (MBCfPE). This study is a part of a series of research, where an earlier pilot study: (1) early software development using MBCfPE; (2) first phase software development using KPKU-BUMN for each of category 2, 3, and 5 (version 1); (3) second phase software development using KPKU-BUMN for each of category 1, 4, 6 and 7 (version 1.1). The main purpose of this research is to integrate process category 1 to 6. Client server system is used to integrate several computers. Opportunity for improvement identification has been added in this research.

Keywords:

Performance Measurement, MBCfPE, KPKU BUMN, Internal Assessment System Software

IE2 - 5

Improving Effervescent Product Yield Through Lean-DMAIC Method: A Pharmaceutical Company Case

Yadrifil[1], Rike Adyartie[2], Annisa Marlin Masbar Rus[3]

Department of Industrial Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424
Phone: (021) 78888805. Fax: (021) 78885656
E-mail: [1]yadrifil@yahoo.com, [2]rikeadyartie@gmail.com, [3]annisamarlinmr@gmail.com

As one of the most well-known pharmaceutical company in Indonesia, it is indeed that the company need to ensure that their production could meet the demand. Problem then arise when their line production yield was too low so that the targeted yield could not be reached. As a proposal to address this challenge, this study applied Lean-DMAIC method as recommendation to solve the problem. In this study, study case is conducted to a pharmaceutical company which has a similar case as stated before. In this case, the company produce effervescent product and its production has not reach the target throughout 2014. As a result of Lean-DMAIC implementation, several improvements on machine, operators, and material are applied and measured. According to the result, the implemented improvements give several benefits for company, such as increasing 3,59% yield, reducing 26,79% material waste cost, and reducing 74,30% machine downtime.

Keywords:

Yield, Lean, DMAIC, Effervescent

IE2 - 6

Service Innovation Design for Platinum Members in Garuda Indonesia Sales and Services Office

Amalia Suzianti, Nadira Winaputri, and Serdi Akbar Maulana

Industrial Engineering, Faculty of Engineering, University of Indonesia
Kampus Baru UI Depok 16424
Email : suzianti@eng.ui.ac.id ; nadira_ti2011@yahoo.com ; serdiakma@gmail.com

Garuda Indonesia as one of the best airlines in Indonesia offers a wide range of services, one of which is sales office service. Based on previous surveys indicates that the customer satisfaction rating for sales office service is relatively low compared to the other services. It is due to the service design for sales office service does not yet include the voice of customer comprehensively. Therefore, this study uses the Kano Model and Customer Journey Mapping to determine services attributes which in line with customers (Platinum Members) preferences. The Kano Model shows that there are several service attributes on Garuda Indonesia sales office included in “attractive” and “one dimensional” category. Customer Journey Mapping indicates that there are two disfavored activities, which is when waiting queue and waiting for service process. Therefore, this study followed by conducting the Focus Group Discussion to determine the problem’s causes as well as recommendations for improving current services. This study further followed by determining the priority recommendations using importance-performance analysis. The result shows that there are four recommendations need to be priorities, which are increasing the number of frontliners during peak hours, providing charging station, providing self city check-in machine and providing supporting facilities in the Platinum Lounge.

Keywords:

Customer Journey Map; Garuda Indonesia; Importance-Performance Analysis; Kano Model; Platinum Members; Sales Office

Job Risk Assesment Toward Labor Facilities Using Job Strain Index Method

Dessi Mufti[a*], Eva Suryani[b], Yusrizal Bakar[c], Tri Marta Putri[d]

[a,b,c]*Bung Hatta University, Gajah Mada Street No 19, Gunung Pangilun, Padang, 25134, Indonesia*

The effectiveness of tool aids is of vital importance in conducting a job. Employing inappropriate tool aids would cause inconvenience and yet risk potential or work injury to the worker. The purpose of this research is to assess the level of occupational risk toward the use of tool aids in the traditional food making process. The production process requires the strength of the hand muscles by utilizing coconut shell. It requires repetition as well. This may cause grievance of pain in both wrists and hands. There are ten respondents in this research. The data collection method is interview and filling out the Nordic Body Map (NBM) questionnaire toward the all ten respondents. NBM is used as a tool to identify the grievance experienced by the worker. Job Strain Index (JSI) is utilized to measure the level of occupational risk. NBM questionnaire result shows the existence of Musculoskeletal Disorders (MSDs) pain particularly on hand and feet. The calculation result of JSI consists of: first, intensity of exertion with a value of 6, second the duration of exertion with a value of 2, third efforts per minute with a value of 1,5, fourth hand/wrist posture with a value of 2, fifth speed of work with a value of 1,5, and the last one task duration per day with a value of 1. And thus, the result of occupational risk assessment is 54. The value of JSI > 7, which means the process of making food with attitude and working position at this time is very dangerous and resulted in MSDs toward the worker. One of the ways to reduce the occupational risk is to improve the facility of food printing and its tool aids. It is expected that these would reduce the occupational risk but improve the productivity.

Keywords:

Distal Upper Extremity, Job Strain Index, Labor facility, Occupational Risk

IE3 - 2

Effect of Driving Duration towards EEG Fluctuations

Maya Arlini Puspasari, Hardianto Iridiastadi, Iftikar Sutalaksana, Ade sjafruddin

Bandung Institute of Technology, Bandung, Indonesia

Road accident in Indonesia increases every year, thus it becomes one of leading problems that needed to be solved. Based on previous studies, mental fatigue is one of the biggest source of road accident, that is majorly affected by mental workload. Driving duration is one of factor that triggers mental fatigue. Electroencephalogram (EEG) measurement is a gold standard to measure fatigue, as stated in previous literature. However, there is limited study that focus on evaluating EEG indicator that is affected by driving duration. Therefore, this study has purpose to address driving duration effect towards EEG fluctuation and its relation to fatigue in driving tasks. Seven participants conducted three hours driving in medium fidelity simulator. One-way ANOVA and correlation analysis were performed on the analysis to measure the effect of driving duration towards EEG indicator and determine the correlation of indicator. The results show that in the end of 3 hours driving, there was an increment of delta and theta activities, followed by decrement of alpha and beta activities. to determine mental fatigue. In addition, the correlation of all bands were significant, with positive result of alpha-beta band and theta-delta band, and negative result towards each other.

Keywords:

Driving Duration; EEG; Fatigue; Road Accident

The Cause Analysis of Gloves and Soap Bar Defect by Using Failure Mode and Effect Analysis (FMEA) In PT. XYZ

[1]Ir. Khawarita Siregar, M.T., [2]Ir. Syahrul Fauzi Siregar, M.T.

[1]Industrial Engineering Department, Faculty of Engineering,
University of Sumatera Utara
[2]Chemical Engineering Department, Faculty of Engineering,
University of Sumatera Utara
Almamater Rd., University of Sumatera Utara, Medan 2017
[1]Email: khawarita@usu.ac.id

XYZ is a company engaged in the production of gloves and soap. The problem faced by PT XYZ is a defect exceeded the limits of standards have been set by the company. The disability can be derived from various aspects such as raw materials, machine, people and work methods used. Types of defects that occur are for products such as soap bars Sompel, broken and cracked. While defect that occurs in the product that is the thickness of the gloves, torn and leaking. Based on that condition, there should be resolving the causes of defect by using the method of Failure Mode and Effect Analysis (FMEA) to analyze every potential cause of disability mechanical failure, prevention and detection. The formula used is RPN (Risk Proirity Number) which is a scale of Severity x occurance x Detection. FMEA results indicate if the product bar soap, RPN high of 168 on the human factor is the lack of skills of workers. While on the glove product, the highest was 126 of RPN is a work environment that cause type of disability smelled tear occurred. The results of the two proposals that give the order to the company to provide training for workers to improve worker skills and create ventilation in the work environment as well as perform routine hygiene measures in order not to reduce the elasticity of latex.

Keywords:

Quality; Gloves; Soap; FMEA; Disability

The Risk Assessment Work of Operator Based on Rapid Upper Limb Assessment Method (RULA) to Improvement of Work System

Ayu Bidiawati*[1], Lestari Setiawati

*[1]Universitas Bung Hatta Padang, Fakultas Teknologi Industri, Jurusan Teknik Industri, Jl. Gajah Mada 19, Olo Nanggalo, Padang(25143)
E-mail: ayubidiawati@bunghatta.ac.id
ayubidiawati@yahoo.com

A good working system can't be separated from the workplace and operational procedures that need to be done in a job. Arranging the workplace, equipment, and body position while working will be very influential in creating integrated working system. Through good working environment, industry could be run effectively and efficiently. Less supportive working method or working system can lead to discomfort for workers during work. It could be due to unergonomic working environment. The process of making bread is divided into several activities, namely mixing dough, weighing, milling, printing, burning, cutting and packing. The process of making bread involves several workers. During production process, most of workers' activities are carried out in standing position and perform the same hand movements over and over again (repetitive). Repetitive and monotonous activities, unergonomic working attitude, bad temperature on some activities, are ergonomic problems that often occur in this bread-making factory. These adversely affected workers' physical state and raise the work risk in form of pain on the part of worker's body. Because of these conditions, work risk identification was performed by method called RULA (Rapid Upper Limb Assessment). RULA method can analyze the risks associated with disturbances in upper body. Analysis was performed to obtain risk level, so work system can be improved to reduce work risk that could endanger workers. The results of RULA method; work stations that have high risk with action 7 category, are work station of stirring, milling, and printing. At the end of the research, we design working aid in form of buffer table, pallet, work support table, and stroller. We hope that the design of working aid can change how the workers work, so work risks can be minimized or even eliminated.

Keywords:

RULA Method, Ergonomics, Occupational Risk Levels, Work Systems

Risk Management of New Product Development Process on Footwear Industry in Indonesia. Case Study: PT Brodo Ganesha Indonesia

Amalia Suzianti[a], Priandra Aditya Wattimena[b], Rheinanda Kaniaswari[a,b,*]

[a,b]*Laboratorium Pengembangan Produk dan Inovasi Departemen Tekik Industri, Fakultas Teknik, Universitas Indonesia, Kampus Baru UI Depok 16424, Indonesia*

Footwear industry has been one of the Indonesian government's concern in order to enhance the nation's economy. Each year, the footwear industry's economic value is increasing and significantly contributing to the national non-mineral export. This indicates that Indonesia has a great opportunity to further enhance its footwear global market share. However, due to the significant growth of the global market demand, the number of competitors in the footwear global industry are also increasing with China as the market greatest influencer. Hence, to compete in the global footwear industry, Indonesian business owners have to increase their competitiveness level. This research is focused on the risk management that might arise during the developing process of a new product in the footwear industry, to increase the competitiveness level of Indonesian footwear industry. Using PT Brodo Ganesha Indonesia as a study case. The method used for the research is House of Risk, a new method adopted from the Failure Mode Effect Analysis and House of Quality methods. The method is not only showing the possibility of risks that might arise, but also focused on giving a proactive strategy to mitigate the identified risk. The outcome of this research is the list of risks that found in the developing process of a new product and the strategy to mitigate those risks involved. This research is designed for footwear industry's business owners as a benchmark for their product development process to make it more efficient.

Keywords:

House of Risk; Risk Management; New Product Development; Footwear Industry; PT Brodo Ganesha Indonesia

IE3 - 6

Maintenance Strategy on Boiler System Steam Power Plant Based on Reliability Centered Maintenance (RCM)

Rahmat Nurcahyo, Nanang Tri Wahyuna dan Yadrifil

Industrial Engineering Department, University of Indonesia
E-Mail: nanangntw1@gmail.com

This research discusses about Maintenance Strategy on Steam Power Plant. The steam power plant has Complex Systems and Equipment subsystems consists of Mechanical Equipment, Electrical equipment and Instrumentations equipment with types and characteristics of different damage. Based on the distribution system and according to the function, the power plant has 8 Main System. Failure History Data System grouped by damage and Pareto diagram visualize Top 20% Failure on whole system. By doing Failure Modes and Effects Analysis (FMEA) obtained by analysis of failure modes, failure causes and effects on the equipment failure to overcome the highest risk at a power plant. After analyzing the highest failure based on the evaluation the highest risk of failure, the failures eliminated by approach of Reliability Centered Maintenance (RCM). As a result study is a Maintenance Strategy with approach based on RCM. Logic Tree Analysis (LTA) is a deductive method of analysis used as a Maintenance Strategy for classifying some failure modes required in determining maintenance decisions (Maintenance Action).

Keywords:

Steam Power Plants, Failure Modes and Effect Analysis (FMEA), Reliability Centered Maintenance (RCM), Equipment Failure, Logic Tree Analysis (LTA), Maintenance Strategy, Maintenance Action

IE3 - 7

Failure Risk Analysis on Core Network of GPRS Equipment Using FMEA & FTA Method and Scenario of Treatment Cost Allocation

Yadrifil[1], Anisa Fithrasari[2], Annisa Marlin Masbar Rus[3]

[1,2,3]*Industrial Engineering Department, Engineering Faculty, University of Indonesia, UI Depok 16424, Indonesia*
E-mail : 1yadrifil@ie.ui.ac.id, 2anisafithrasari@yahoo.com, 3annisamarlinmr@gmai.com

Due to the increasing of mobile communication development, GSM operators are motivated to provide more efficient data services with a high speed feature and also introduce new services. In order to do this, GPRS could be applied as a solution to address the challenge. However, as the GPRS becomes a key for GSM operators to compete in the market especially in internet service are, focus on GPRS potential risk failure should get more attention. Thus, the purpose of this research is to conduct a risk analysis on GPRS maintenance activity that lead to designing risk treatment action and scenario of treatment cost allocation. In this research, FMEA method is employed to obtain the critical risks which will be further analysed using FTA to identify the basic event of those critical risk. Moreover, OptQuest-Crystal Ball simulation is employed to find the optimal treatment cost allocation. As a result of this research, three main points could be concluded. First, 8 critical risks are successfully drawn from 28 identified risks. Furthermore, based on the research, it is suggested that every critical risk should have different treatment actions. Lastly, according to the result of cost allocation using OptQuest simulation, the higher the cost allocation that is given to treat critical risks, the higher the maximum total advantage.

Keywords:

GPRS; Risk Analysis; FMEA; FTA; Optquest-Crystal Ball Simulation

The Analysis of Ergonomic Design of Tactical Commander Console (TACCO) in the Virtual Environment of Medium-Ranged Twin-Engined Maritime Patrol Aircraft (MPA)

Billy Muhamad Iqbal[1], Armand Omar Moeis[1], Renalda Krissalam[1]

[1]*Ergonomics Centre Laboratory Industrial Engineering Department, Faculty of Engineering, University of Indonesia, Depok 16424*

This study is done to examine ergonomic aspect on the design of Tactical Commander Console (TACCO) in the virtual environment of medium-ranged twin-engined aircraft. The analysis conducted using Jack 6.0 software. The evaluation method being used in this study is the Posture Evaluation Index (PEI) method which integrates the results of analysis from three methods: Lower Back Analysis (LBA), Ovako Working Posture Analysis (OWAS), and Rapid Upper Limb Assessment (RULA). The purpose of this study is to evaluate the actual design of Tactical Commander Console (TACCO) and to search the most ergonomic design configuration; which reviewed from the distance and the tilt angle of panel and the height of chair. The result of this study shows that the ergonomic design of Tactical Commander Console (TACCO) are: panel with the distance of 10 cm and the tilt angle by 60˚, and the chair height of 29,5 cm.

Keywords:

Ergonomic; Tactical Commander Console (TACCO); Virtual Environment; PEI

Optimal Physical Environment to Maintain Concentration on Office Work in Tropical Climate in Indonesia

Lovely Lady[a*], Nisfaeni[b]

[a,b]*Industrial Engineering Department, Faculty of Engineering-Untirta*
Jl. Jend.Sudirman Km.3 Cilegon, Banten 42435 – Indonesia

Doing Office work or learning requires concentration. The people will design comfortable work space physical environment, including the temperature and lighting. Sometimes they set of music background so they can work comfortable. The purpose of this study is to determine the optimal temperature setting and sound background to maintain concentration when doing office work in tropical climate in Indonesia. Others indoor physical environment on this study is set fixed and at appropriate conditions for office work. Level of lighting is at the 250 lux, noise when there is no music at the level of 60 dB, and humidity at the level of 56%. Research was done by an experiment in the office room, independent variables are temperature and sound background, and the dependent variable is concentration levels. Temperature was set using the Air Conditioner at three levels 18ºC, 23ºC, and 28ºC that represents the level of indoor temperatures in Indonesia. And two setting of sound background was background of prefered music, type of pop music with the tempo of 74 BPM and background without music. Respondent is students with a range of age between 19 to 22 years old. Concentration test was performed with a test of psychophysics based of software ' Design Tools ' version 3.00 of the Method, Standard and Work Design 11th Edition by Benjamin Niebel and Andris Freivalds-Mc Graw Hill in printed version. Model of the question of concentration test is choosing a longer line between two lines on the display. The length and position of two lines at each question is displayed randomly. According to analysis of variance, temperature and background music affect work concentration significantly, value of significancy = 0,000. According to post hoc test at temperature variabel, the level of work concentration at temperature of 18ºC and 23ºC did not differ significantly, $\alpha = 0.504$. But at room temperature of 28ºC, there was a decrease in concentrations significantly by the value $\alpha = 0.000$. There was no difference in the level of concentration when working with the preferred music background or without music background on temperatures of 23ºC and 28ºC which respondents dominantly feel cool, warm, or heat on thermal sensation. But music background help improving concentration score in cold thermal sensation. Based on a subjective assessment against the convenience of room temperature using the thermal sensation scale points 7, dominant respondent stated they felt cool (60%) and felt sligtly cool (20%) on room temperature of 23ºC, above number of respondent who felt cool on others level of room temperture. Based on this research the efficient temperature setting for work concentration and comfortable is 23ºC either by music background or no music background.

Keywords:

Concentration; Physical Environment; Temperature; Music Background; Efficient

Mangusada Hospital Go to the Ergonomics Hospital

I Ketut Widana

Bali State Polytechnic, Kuta Selatan, Badung 80364, Indonesia

Mangusada Hospital is a regional public hospital of Badung Regency in Kapal City is a hospital which was designed with a modern architectural approach. Ready to become the modern tourism hospital by ergonomics approach. The shape of the building is mounted with concrete piles spread around, makes it always be susceptible to all kinds of threats, especially acts of God such as: earthquake, fire, and whirling wind. From those kinds of disaster mentioned above, the earthquake is the most serious threat. The capability to escape of the medical patients when the earthquake happens is on the lowest priority as they need assistances from their relatives. In such condition, the evacuation path, prepared rescuing facilities and volunteers are the factors that determine the success of human life saving effort, especially the medical patients who are staying in the hospital. Generally, tools and infrastructures of emergency response that are available at the site are very limited. Most of the hospital management staffs do not understand or less care about the possibilities of dangers. This research is aimed at studying the readiness of Mangusada Hospital management in planning emergency responses, especially in facing a threat of collapse of the physical construction of the hospital due to the earthquake. The analysis of emergency response capability is performed with methods of observation and interview. The data collection comprises a risk identification, a building lay out, an evacuation procedure, an accuracy of physical facility supports such as in placing fire hydrants, and emergency doors. The interview is done with a safety expert and management staffs of the hospital and also observers of construction problems, especially those of the regional assembly commissions and the contractor of the building. The result of analysis shows that the management's commitment that is not written yet makes the implementation of safety care is less maximal. As big potencies of danger at the hospital wards, such as a lot of easy burning materials, lack of volunteers, unavailable of emergency evacuation path, make it necessary to work on an emergency management through training, preparing tools and operators as well as the hospital management's commitment to be care about the disaster threats.

Keywords:

Commitment; Management; Hospital; Disaster; Analysis

The Ergonomic Kue Balok Baking Tool Production which Fueled by Charcoal

Dwi Novirani[a], Gita Permata Liansari[b]

[a,b]*Industrial Technology, Institut Teknologi Nasional*
Jl. PKH. Mustapha No. 23, Bandung 40124, Indonesia
Email: dwinovirani@gmail.com, gitapermata@itenas.ac.id

The traditional cake which is popular again in the area of western Java which have increasing demand is Kue Balok, but the baking tool of the cake does not currently take into consideration of the Ergonomic factors as ECSHE (Effective, Convenient, Safe, Healthy and Efficient), so that the cake operator always feel pain mainly on his back and waist because he always bends, and also the heat produced by the charcoal as the fuel hit directly to the operator, the grip of iron baking tool is hot and not convenient, etc. The output of this research is the ergonomic baking tool prototype which is charcoal-fueled by a functional test process. The choosing of the material for the manufacture of baking tool prototype is taken into consideration of the ECSHE factors and the prototype of the Kue Balok baking tool is also made to be portable.

Keywords:

Kue Balok, Traditional Cake, Baking Tool, Ergonomic, ECSHE, Portable

IE4 - 5

Neuromarketing Evaluation of Online Shop Advertisement Using Electroencephalogram (EEG)

Danu Hadi Syaifullah[a1], Maya Arlini Puspasari[b], Timotius Alfin[c]

[a,b,c]*Department of Industrial Engineering*
Faculty of Engineering – University of Indonesia, Depok 16424
Tel: (021) 78888805. Fax: (021) 78885656

Indonesia has a very strong growth as an online shop market. Big market growth at Indonesia makes there are many online shops join and operate at Indonesia. To gain the market, online shop in Indonesia was doing so many marketing activities; one of them is through Youtube channel. Using Youtube channel as marketing channel means using video as the content. Before using video as marketing content, developer needs to know characteristics of online shop advertisement which can attract the viewer. In this research, writer evaluates online shop advertisement based on cognitive and emotional response of viewer. The methods of this research are Frontal Alpha Asymmetry Analysis (FAA) and Positive and Negative Affect Scale (PANAS) questionnaire. Frontal Alpha Asymmetry Analysis using data from electroencephalogram of response of respondent while watching advertising video. Based on result of this research, there are several characteristics of online shop advertising video that affect and did not attract viewers significantly.

Keywords:

Frontal Alpha Asymmetry (FAA), Electroencephalogram (EEG), Neuromarketing, Positive and Negative Affect Scale (PANAS), Digital Marketing

IE4 - 6

Integrating Ideas Digital Human Modeling in Electronic Industry to Improve Human-System Performance

Tegar Septyan Hidayat[a]

[a]*Universitas Indonesia, Depok*

In Indonesia, most of companies don't consider Human factors as the important part in the workplace, so it affects occupational risk as well as performance of industrial workers especially in manufacturing sector. In this research, we explore the ergonomics aspect from electronics industry based in Indonesia using Digital Human Modeling (DHM) approach. DHM is ergonomics concept which usually refers to modelling physical aspect of human with main focus on anthropometry and physical strain. It is used as the part of ergonomics improvement initiative to avoid worker injuries and improve human performance in order to be more productive. Based on the previous researches, we found that there is a need to propose a step by step framework in DHM in order to make the work redesign more systematically. We propose IDEAS framework as a step by step approach for work redesign which includes 5 steps (Identify, Design, Evaluate, Adapt, and Synergize) from situation identification until it can be ready to be implemented. The analysis of working posture based on Rapid Upper Limb Assessment (RULA), Low Back Analysis (LBA), and NIOSH Lifting Equation using Jack Tecnometrix Siemens software to compare result of ergonomics postures and their interaction in current condition and simulated environment. After evaluating condition, we propose the solution based on ergonomics consideration and making pilot testing in order to implement it successfully in the real system. As the output of this research, we provide several alternative design which can reduce the musculoskeletal risk of operators as well as the service level in production line. Based on this research, using IDEAS framework is suitable for redesigning occupational task based on digital human modelling approach, because it can provide structured approach from identifying the task, designing virtual environment, evaluating ergonomics condition, adapting, and synergizing solutions. Furthermore, IDEAS framework is feasible to be adopted in managing work redesign in many areas for occupational ergonomics.

Keywords:

IDEAS; Digital Human Modeling; Work Redesign; Electronic Company; Human Factors

Managing Port Cluster Dynamics: Development of Port Policy Model

Armand Omar Moeis[a1], Himawan Pranamukti[ac], Akhmad Hidayatno[a], Mohammad Rizky Nur Iman[a], Naufa Muna[b]

[a]*Universitas Indonesia, Kampus Baru UI, Depok 16424, Indonesia*
[b]*Trade Analysis and Development Agency, Ministry of Trade Republic of Indonesia*
[c]*PT Sucofindo (persero), Jakarta, Indonesia*

A port is a hub of a trading network. Its role becomes even more strategic in an archipelago country such as Indonesia, as a driver of national economic growth. Tanjung Priok Port is the most important port in Indonesia, where Indonesia's economic growth is highly dependent on its capacity. The port's capacity development planning has been designed through 2030 and will dynamically affect the existing systems and its environment. This study will analyze the system, explore the policy area and synthesize result of system analysis and institutional analysis. The result of the synthesis is the port policy model itself and then simulated with system dynamic modelling to challenge the policy prior to its implementation.

Keywords:

System Analysis, Actors Analysis, Port Capacity, Port Policy, System Dynamics

IE5A - 2

Analysis of Situation and Competitive Strategy Formulation for the Vision and Mission Toward the in Year of 2020 (Case: in MIDC Ministry of Industry Indonesia)

Hafid Abdullah[a] and Sony Harbintoro[b]

[a,b)Metal Industies Development Centre (MIDC) - Ministry of Industry Indonesia
Jl. Sangkuriang No. 12 Bandung 40135
E-mail : hafidochan@yahoo.com

Analysis of situation and competitive strategy formulation for the vision and mission towards in the year of 2020 (Case: in MIDC Ministry of Industry Indonesia) has been done. The aim of this research is to guide the direction for the company leaders and the entire employee of the MIDC in carrying out research and development (R & D) metal and machinery programs during the period year of 2014-2020. Also to sharpen R & D activities as an effort to increase the performance of MIDC value increase R & D results in an optimal benefit. This research method is using primary and secondary data. The primary data obtained through field surveys pick-test data collection through observation, directly interviews and discussions with the expert judgements. While secondary data obtained from the BPS, scientific journals, browsing internet and other sources. The analysis, include: (1) the vision, mission, strategic goals and objectives of the company, (2) current business analysis of the position, both internal and external, using EFAS and IFAS (TOWS) methods, (3) the corporate strategy of MIDC, (4) strategic policy direction of MIDC based on core competencies, core products, marketing strategies and work programs. Based on the results of the analysis the obtained value EFAS dan IFAS approximately 7.6 and 6.6. To shown the position of MIDC is winner in the growth. The results of this analysis are expected to MIDC can achieve this goal in accordance with the vision and mission.

Keywords:

External Strategic Analysis (EFAS), Internal Strategic Analysis (IFAS), Treath, Opportunity, Weakness and Strength (TOWS/SWOT)

Analysis of CO2 Emission Effect from Coal-Fired Power Plant to Gross Domestic Regional Product at Jakarta

Arry Rahmawan Destyanto, Akhmad Hidayatno, Adinda Amalia

Systems Engineering Modeling and Simulation Lab, Industrial Engineering Department
Faculty of Engineering, Universitas Indonesia
Depok, Indonesia

Rapid economic growth phenomenon gives rise to energy consumption in Jakarta including electricity needs. In order to supply the needs, Perusahaan Listrik Negara (PLN), Indonesia state-owned electricity company have a plan to build the additional power plant which dominated by the coal based power plant. However, this mega project has impact on Jakarta economy (gross domestic regional product) and CO2 emission effects through the social cost of carbon, because that coal-fired power plant has the highest emission rate if comparing with other power plant types. Through system dynamic approach, the aim of this study is to examine several alternative policy scenarios and obtain best options which can be applied by Jakarta government in order to keep electricity production success, which can grow Jakarta economy and minimise CO2 emission effects simultaneously. There are three policies that will be simulated to the model, business as usual, green policy and good economy policy.

Keywords:

Electricity; Gross Domestic Regional Product; Social Cost of Carbon; System Dynamic

IE5A - 4

Application of Technology Assesment in Carbon Capture and Storage Technology Implementation for CO2 Emission in Indonesia

Akhmad Hidayatno, Arry Rahmawan Destyanto, Reinaldo Giovanni

System Engineering, Modeling, and Simulation Laboratory, Industrial Engineering Department
Faculty of Engineering, Universitas Indonesia

Green house gases (GHG) emission is one of the environmental issues that hasn't been resolved and continued to increase annually. Carbon dioxide gas is known as the largest contributor for GHG emissions. This environmental issue also happens in Indonesia as a developing country which has focused on sustainable development. In 2020, the total emission of carbon dioxide gas in Indonesia is predicted around 960 million ton if there is no mitigation action. In developed countries, they have a bold step to mitigate their emission of CO2 gas by using Carbon Capture and Storage (CCS) technology. This technology is effective to reduce the CO2 emission in large-scale. The study and information about CCS, as a new technology to reduce emission, haven't well developed in Indonesia. Based on the situation, the author tries to find important criteria for conducting a research of CCS technology implementation in Indonesia using participatory technology assesment. The output from this research are giving understanding how CCS could be used by seeing what important criteria needed by stakeholder to develop, particularly in Indonesia. The rate of carbon capture of CO2 emission and the cost of investment for carbon capture technology are the main subcriterias for each criteria of environment and economic if the carbon capture technology implemented in Indonesia.

Keywords:

Technology Assesment, Carbon Capture and Storage Technology, CO2 Emission, Assesment Criteria

IE5A - 5

Why Did Not All High Quality Products Always Satisfy Their Users? A Case Study of Passenger Cars and Its Drivers

Muhammad Habiburrahman[1,a], Djoko Sihono Gabriel[1,b], Rahmat Nurcahyo[1,c]

[1]Department of Industrial Engineering, Universitas Indonesia, Depok Campus, Indonesia 16424
[a]m.habib.st@gmail.com, [b]dsihono@gmail.com, [c]rahmat@eng.ui.ac.id

Quality improvement of a product becomes an important program at most of manufacturers and needs various resources to make the programs work properly. But if the products quality achieved at highest level of criteria, will the customers always satisfy with it? Previous research and experience proved that statement but need deeper elaboration why not all of users satisfied by genuine quality of products. A case study of multi purposes van (MPV) automobile and its user using Structural Equation Modelling with Partial Least Square (PLSSEM) and SmartPLS software supported the analysis prepared for this work. In depth data collecting with questionnaires from 516 car drivers in Jakarta, Bogor, Depok, Tangerang and Bekasi conducted to reveal the role of users related to their post purchase satisfaction. A computer program prepared for SEM with steps of analysis designed to clarify the relationship between the quality of MPV and driving satisfaction as well as the role of driving quality. This research concluded that driving quality of MPV drivers intervened the relationship between variables. Lower quality of driving will reduce driving satisfaction whether the quality of MPV was very good. Otherwise, high quality of driving will not only enhance the satisfaction, but also leverage the effect of other variable to driving satisfaction. The intervening variable role will give new approach in developing and maintaining driving satisfaction. A new approach of customer satisfaction improvement proposed and valuable programs of MPV producers with a new paradigm will improve manufacturer competitive advantage.

Keywords:

Multi Purposes Van; Intervening Variable; Driving Quality; Driving Satisfaction; PLS-SEM

Application Study of Evolutionary Operation Methods in Optimization of Process Parameters for Mosquito Coils Industry

Elisabeth Ginting[1], Mangara Tambunan[2]

[1,2]*Industrial Engineering Department, Faculty of Engineering, University of Sumatera Utara, Medan, Indonesia, ir.elisabethginting@gmail.com, araapul_tambunan @yahoo.com*

Evolutionary Operation Methods (EVOP) is a method that is designed to be used in the process of running or operating routinely in the company to enables high productivity. A good quality product is one of the critical factor for a success company to win the competition. Because of these conditions the research for products quality has been made by gathering the production data of the company and make a direct observation to the factory floor especially the drying department to identify the problem which is the high water content in the mosquito incense coil. PT.X which is producing mosquito coils attempted to reduce product defects caused by the inaccuracy of operating conditions. One of the parameters of good quality insect repellent that is water content, that if the moisture content is too high then the product easy to mold and broken, and vice versa if it is too low the products are easily broken and burn shorter hours. There are three factors that affect the value of the optimal water content, the stirring time, drying temperature and drying time. To obtain the optimal conditions Evolutionary Operation (EVOP) methods is used. Evolutionary Operation (EVOP) is used as an efficint technique for optimization of two or three variable experimental parameters using two-level factorial designs with centerpoint. Operating conditions that is obtained in the experiment are a stirring time performed for 20 minutes, drying temperature at 65°C, and drying time for 130 minutes. The results of the analysis based on the method of Evolutionary Operation (EVOP) value is the optimum water content of 6.90%, which indicates the value has approached the water content to be achieved in a production plant that is 7%.

Keywords:

Evolutionary Operation (EVOP) Method, Mosquito Coils, Online Quality, Control, Product Quality

IE5B - 2

Supplier Performance Evaluation Methods Using Data Envelopment Analysis Banker, Charnes, Cooper Model and Super Efficiency Model in Pumping Unit Producer

Yadrifil[1], Irmawati Ulfah[2], Annisa Marlin Masbar Rus[3]

Department of Industrial Engineering, Faculty of Engineering, University of Indonesia Kampus Baru UI Depok, 16424, Indonesia

E-mail: [1]yadrifil@eng.ui.ac.id, [2]irmawati_ulfah@yahoo.com, [3]annisamarlinmr@gmail.com

Performance of raw materials suppliers affects the productivity of firms. Performance is the primary information for management decisions in managing a cooperative relationship to a supplier. So the term evaluation is needed to monitor the performance of suppliers. Commonly, evaluation conducted with limitation so that the result could not satisfy improvement targets. This study attempts to propose a supplier performance evaluation using the method of Data Envelopment Analysis (DEA) which is a relative efficiency measurement method based on linear programming. Supplier evaluation results then enhanced by ranking the suppliers using the Super Efficiency DEA model. This model can determine the ranking of suppliers even if the BCC model consider it as efficient. Supplier ranking aims to determine the most ideal supplier of the overall supplier as a benchmark for future evaluation assessment. As a result, four out of six suppliers are considered as efficient. Moreover, by applying the Super Efficiency DEA, rank orders of the suppliers are found as well.

Keywords:

Data Envelopment Analysis; Model of Banker, Charnes, Cooper; Supplier Evaluation; Super Efficiency DEA

IE5B - 3

Shipping Route Model Development for the Indonesian Pendulum Ports

Zulkarnain, Komarudin, Armand Omar Moeis, Seto Banuwijoyo

Department of Industrial Engineering, Universitas Indonesia, Depok Campus, 16424, Indonesia

Maritime logistics sector has a very important role in Indonesia for almost all domestic commodities shipped by sea. Indonesian state has a program to balance the economy by balancing the levels of domestic cargo shipments between the western region and the eastern region. Due to the nature of this non-commercial program, a design of marine transport with the aim of minimizing costs is needed. The study aims to develop a shipping route model by considering several factors: the type of Landing Craft Tank (LCT) used, the route passed, and the amount of cargo shipped. The method used in this research is known as the Mixed Integer Programming with the design of the shipping route called Butterfly Route, simulated using the Gurobi software. Several factors that affect the results of the design is the availability of LCT, the distance between the ports and the planned amount of cargo.

Keywords:

Maritime Logistics; Cargo; Landing Craft Tank; Port; Mixed Integer Programming; Butterfly Route; Gurobi software

IE5B - 4

The Layout Optimization of Production Process Facilities in Apple Processing to Improve Productivity and Sustainability SMEs

Debrina Puspita Andriani, Muhammad Hafid Zamroni, Tiffany Clara Alesi, Fajri Rahman

Universitas Brawijaya, Jl. MT. Haryono 167, Malang 65145, Indonesia

Small and medium enterprises (SMEs) have a significant influence for social and economic development in Indonesia. The increasing amount of SMEs in several regions of Indonesia led to fierce competition. The development of SMEs is the key targets to strengthen and sustain the economy of Indonesia. Kota Batu is one of the region in Indonesia with SMEs reached more than 20 thousands which featured local products are apple processing. The intense competition for the similar SMEs in these areas has made SMEs owners realize the production process is an important factor of sustainable entrepreneurship engagement. Unfortunately, many SMEs run their production processes without sufficient knowledge and studies to obtain optimal results. Facility planning is an effort of the company to organize a variety of means of production in order to provide efficiency in terms of layout. This study was expected to determine the relationship between the proximity of facilities in the production floor, provide proposed alternatives facility layout to the production floor, and choose the best alternative layout for the production floor. In this study, activity relationship chart (ARC) was built to identify the relationship between the proximity of production facilities. Then designed the layout of the facility using BLOCPLAN method produced proposed alternatives layout of the facility. Each alternative layout had a value of Adjacency score, R-score, and Rel-dist Score that will be used as criteria for selecting the best facility layout alternative by using brainstorming with the owner. Finally the recommendation based on this analysis can be given to SME owner in order to improve productivity and sustainability SME.

Keywords:

Apple Processing; BLOCPLAN; Facility Layout; SMEs

Optimization of Industrial Production Planning with Uncertain Raw Material Supply

Farizal, Sucipto, Amar Rachman

Department of Industrial Engineering, Faculty of Engineering, Universitas Indonesia
Kampus Baru UI Depok, Jawa Barat, 16424, Indonesia
Corresponding E-mail: farizal@eng.ui.ac.id

This study discusses the optimization model ofindustrial production planning in patchouli oil derivatives industry. Production planning always deals with uncertain demand. This industry, as addition, is also characterized with uncertain raw material supply. Taking those issues into consideration, the objective of this optimization model is to minimize the production cost, carrying, and backlogging costs. For the purpose.the forecasting methods used is moving averages method through software Oracle Crystall Ball while the linear programming model was optimized by Lingo software. The result shows that the model can streamline 19.09% of the actual conditions in the absence of planning. In addition, further analysis of efficiency can also be done by raising the purchase price of raw materials less than 1,67% if supplying to be under certainty.

Keywords:

Optimization, Production Planning, Production Costs, Forecasting, Uncertain Supply

IE5B - 6

Modeling and Simulation of Stacking Rules in Container Terminals with a Discrete Event Simulation Approach

Armand Omar Moeis*, Muhammad Harisuddin

Universitas Indonesia, Kampus Baru UI, Depok 16424, Indonesia

The traffic flow enhancement of international containers increases every year along with continuous economic growth. Therefore, there is a need to improve container terminal operations. This study focuses on modeling a stacking yard. Good container stacking rules should reduce reshuffling, which is considered as waste in container terminal operations. This study provides a means to understand what stacking rules are and its impact on container terminal operations efficiency.

Keywords:

Container Terminal, Stacking Yard, Stacking Rules, Discrete Event Simulation

IE5B - 7

A Simple Heuristic Algorithm for Stowage Planning in Containership

Romadhani Ardi, Armand Omar Moeis, Raymond Bonakapvi

Department of Industrial Engineering, Faculty of Engineering
Universitas Indonesia
Depok, West Java, Indonesia
romadhani.ardi@ie.ui.ac.id

The container terminal systems in Indonesia have to deal with productivity improvement issues caused by increasing traffic flow of containers. One of the main issues is to develop a good stowage planning that considers the stability of the ships and minimizes the container *overstowage*. This study proposes an algorithm to cope with such issues. As the results, a decision support system with a simple heuristic algorithm is developed and able to solve the problems with several notable improvements.

Keywords:

Stowage; Planning; Containership; Algorithm; Stability of the Ships; Overstowage

Developing and Implementing the Patient-Centered Care Model for Hospital in Indonesia

Jonny[a], T. Yuri Zagloel[b1]

[a]*Department of Industrial Engineering, Faculty of Engineering, University of Indonesia and Department of Accounting, Faculty of Economic and Communication, Bina Nusantara University*
[b]Department of Industrial Engineering, Faculty of Engineering, University of Indonesia
[1]*Corresponding author.
E-mail address: Jonny & Zagloel@ui.ac.id

This paper reviews the literature on integrated management system (IMS) between quality management system and occupational health and safety management system. The term integrated management system is clarified as it is typically applied to integrated risk, integrated process, and integrated audit in order to achieve orderly construction. The objective of the present study is to analyze the evolution of IMS research, presenting its contributions and gaps in the IMS scope. The analysis was conducted through a theoretical framework of IMS. Some clarification in terms of integrated risk, integrated process and integrated audit of engineering and its theoretical developments. Methodology used in this paper is comprehensive literature review of integrated management system between quality management system and occupational health and safety management system to influence performance of integrated risk, integrated process and integrated audit of quality and safety system in orderly construction. This paper piloting project in time phase of activities In Ministry of Public Work and Public Housing as a core activities. Results of this study shows conceptual framework for development of integrated management system between Quality Management System and Occupational Health and Safety Management System. All management systems were used Deming Cycle (PDCA) theory and have common feature. In this study, author found that Fayol Theory based on activities management can develop management system into integrated management system. Based on activities in System Engineering Phase, authors found that life cycle system in construction are the best system suited in Integrated Management System between Quality Management System and Occupational Health and Safety Management System as the state-of-the-art of this research. This integrated management system was piloting in Ministry of Public Works and Housing Provision that application of independent system management. Implementation of integrated management system assumes can achieve orderly construction with less of rework, less risk of accident, and risk of waste. It is suggested the gaps found in this paper are explored in future studies.

Keywords:

Patient-Centered Care Model; Kano's Model; Quality Function Deployment; Balanced Scorecard; Hospital's Profitability; Patient Satisfaction; Quality Of Health Care; Health Care Cost

Box Crane Hour, Container, Idle Time, Port, Terminal Performance

Dewi Kusumawaty[1], Humala L. Napitupulu[2], Meilita T. Sembiring[3]

Magister in Industrial Engineering, Faculty of Engineering, University of North Sumatera
Jl. Prof. T. Maas Kampus USU

Baristand Industri Medan is a technical implementation unit under the Industrial and Research and Development Agency, the Ministry of Industry. One of the services often used in Baristand Industri Medan is liquid waste testing service. The company set the standard of service 9 working days for testing services. At 2015, 89.66% on testing services liquid waste does not meet the specified standard of services company. The purpose of this research is to specify the standard time of each parameter in testing services liquid waste. The method used is the stopwatch time study. There are 45 test parameters in liquid waste laboratory. The measurement of the time done 4 samples per test parameters using the stopwatch. From the measurement results obtained standard time that the standard Minimum Service test of liquid waste is 13 working days if there is testing E.Coli.

Keywords:

Minutes, Testing Liquid Waste, Test Parameter, Standard Time

IE5C - 3

The Improvement of Production Cost Efficiency Using Activity Based Management in PT. XYZ

Anita C. Sembiring[a], Anggianika Mardatillah[a], Uni P.P. Tarigan[a1]

[a]Industrial Engineering Department University of Prima Indonesia, Jl. Sekip Simpang Sei Sikambing, Medan 20111, Indonesia

Activity Based Management Method seeks to identify and ultimately eliminate all non-value-added activities and at the same time will increase the efficiency of value-added activities (value added activity). The cost efficiency of production is done by identifying and reducing non-value-added activity thus decreasing production costs and increasing profit . PT. XYZ is a company engaged in the production of squid which has a higher price than market price at Rp 50,000 per Kg, while in the market price of squid only Rp 35,000 per Kg. Imposition of production costs to each of each activity conducted to investigate the cost of each activity undertaken by the company during the production. Activity analysis is key to achieving cost efficiency goals. Based on the discussions carried out, the implementation of Activity Based Management looks at the reduction of activities that are not value-added in the production process. Because each of these activities consume costs, the reduction in value-added activity does not affect the reduction in production costs. Decrease in production costs mainly in lower costs of material removal. The results showed that an increase in production cost efficiency before the repair after repair with 2,60%. By increasing the efficiency of production costs, the cost of which is used for the production process to be decreased and the profit received by the company continues to increase. In addition, corporate profits are rising value of the product in the eyes of consumers. Thus, the company is able to win the competition from all aspects.

Keywords:

Activity Based Management, Cost product, Value Added Activity, Process Value Analyze

The Material Handling Cost Analysis for Chinese Traditional Praying Paper Industry

Harmein Nasution[a], Irwan Budiman[b]*, Agus Salim[b]

[a]*University of Sumatera Utara/ Industrial Engineering Department*
[b]*University of Prima Indonesia/ Industrial Engineering Department*
E Mail: harmein_nasution@yahoo.com, irwanb01@gmail.com, aguslyn95@gmail.com

Chinese traditional praying paper industry is an industry which produced chinese traditional religion praying paper. This kind of industry is rarely examined since it was only in Small and Medium Enterprise (SME's- form). This industry produced various kinds of Chinese traditional paper products. The purpose of this research is to increase the amount of production, reduce waiting time and moving time, and reduce material handling cost. The research was conducted at prime production activities, measurement of displacement, and the load that must be displaced manually or by trolley. This displacement condition leads to ineffective and inefficient production process. Alternative was developed using production judgement and aisle standard. Based on the observation results, it is possible to reduce displacement in the production. Using alternative which by-passed displacement from Rolled paper in temporary warehouse to cutting and printing workstation, it can reduce material handling cost from 2.26 million rupiahs to 2.00 million rupiahs only for each batch of production. This result leads to increasing of production quantity, reducing waiting and moving time about 10% from the current condition.

Keywords:

Material Handling Cost; Chinese Traditional Praying Paper; Layout; SME, Moving Time, Waiting Time

IE5C - 5

Analytic Hierarchy Process (AHP) Pairwise Matrix with One Missing Value

Erlinda Muslim[1], Irvan Riansa, and Komarudin

Department of Industrial Engineering Universitas Indonesia, Depok 16424, Indonesia

In order to obtain the results of an Analytic Hierarchy Process (AHP), all lower or upper triangle elements of the pairwise matrix need to be filled-in. As the number of criteria of AHP increases, the number of elements of the pairwise matrix increases quadratically. This forces an expert to answer a large number of comparisons. This paper studies and analyzes the characteristics of a pairwise matrix when one of its element is not available. This is one of the efforts to decrease the number of comparisons that need to be provided by an expert. The results show that a complete pairwise matrix that is consistent, tends to have the same characteristics (the priority sequence and consistency index) when it has one missing value. Future research are still needed so that the number of comparisons can be decreased while keeping the pairwise matrix to be consistent.

Keywords:

Analytic Hierarchy Process; Pairwise Matrix; Consistency Index; Missing Value

Segmentation of Natural Gas Customers in Industrial Sector Using Self-Organizing Map (SOM) Method

Annisa Marlin Masbar Rus[1], Rediani Pramudita[2], Isti Surjandari[3]

[1, 2, 3]Departemen Teknik Industri
Fakultas Teknik - Universitas Indonesia, Depok 16424
Tel: (021) 78888805. Fax: (021) 78885656
[1]annisamarlinmr@gmail.com, [2]redianipramudita@gmail.com, [3]isti@ie.ui.ac.id

The usage of the natural gas which is non-renewable energy, needs to be more efficient. Therefore, customer segmentation becomes necessary to set up a marketing strategy to be right on target or to determine an appropriate fee. This research was conducted at PT PGN using one of data mining method, i.e. Self-Organizing Map (SOM). The clustering process is based on the characteristic of its customers as a reference to create the customer segmentation of natural gas customers. The input variables of this research are variable of area, type of customer, the industrial sector, the average usage, standard deviation of the usage, and the total deviation. As a result, 37 cluster and 9 segment from 838 customer data are formed. These 9 segments then employed to illustrate the general characteristic of the natural gas customer of PT PGN.

Keywords:

Clustering; Characteristic of the Usage; Customer Segmentation; Data Mining; Natural Gas; Self-Organizing Maps

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CHE

CHE1 - 1

Degradation Behaviour of Gamma Irradiated Poly(Acrylic Acid)-Graft-Chitosan Superabsorbent Hydrogel

Dhena Ria Barleany[1], Alpin Ilhami, Dea Yusuf Yudanto, Erizal[2]

[1]*Department of Chemical Engineering, Faculty of Engineering, University of Sultan Ageng Tirtayasa, Cilegon, 42434, Indonesia*

[2]*Centre for Application of Isotopes and Radiation, Jakarta, Indonesia*

A series of superabsorbent hydrogels were prepared from chitosan and partially neutralized acrylic acid at room temperature by gamma irradiation technique. The effect of irradiation and chitosan addition to the degradation behaviour of polymer were investigated. The gel content, swelling capacity, Equillibrium Degree of Swelling (EDS), Fourier Transform Infra Red (FTIR), and Scanning Electron Microscopy (SEM) study were also performed. Natural degradation in soil and thermal degradation by using of TGA analysis were observed. The variation of chitosan compositions were 0,5; 1; 1,5; and 2 g and the total irradiation doses were 5, 10, 15, and 20 kGy. The highest water capacity of 583,3 g water/g dry hydrogel was resulted from 5 kGy total irradiation dose and 0,5 g addition of chitosan. From the thermal degradation evaluation by using of TGA analysis showed that irradiation dose did not give a significant influence to the degradation rate. The rate of thermal degradation was ranged between 2,42 to 2,55 mg/min. In the natural test of degradation behaviour by using of soil medium, the hydrogel product with chitosan addition was found to have better degradability compared with the poly(acrylic acid) polymer without chitosan.

Keywords:

Acrylic Acid; Chitosan; Degradation; Gamma Irradiation; Graft; Superabsorbent

The Use of Multi-Reactor Cascade Plasma Electrolysis for Linear Alkylbenzene Sulfonate Degradation

Nelson Saksono[1*], Ibrahim[1], Zainah[1], Trisutanti Budikania[2]

[1]*Department of Chemical Engineering, Universitas Indonesia, Depok 16242, Indonesia*
[2]*Politeknik AKA, Bogor, Indonesia*
Phone: +62217863516, Fax: +62217863515
**nelsonsaksono@gmail.com*

Plasma electrolysis is a method that can produce large amounts of hydroxyl radicals to degrade organic waste. The purpose of this study is to improve the effectiveness of Linear alkylbenzene sulfonate (LAS) degradation by using multi-reactor cascade plasma electrolysis. The reactor which operated in circulation system, using 3 reactors series flow and 6 L of LAS with initial concentration of 100 ppm. The results show that the LAS degradation can be improved multi-reactor cascade plasma electrolysis. The greatest LAS degradation is achieved up to 81.91% with energy consumption of 2227.34 kJ/mmol that is obtained during 120 minutes by using 600 Volt, 0.03 M of KOH, and 0.5 cm of the anode depth.

Keywords:

LAS Degradation; Plasma Electrolysis; Hydroxyl Radical

Carbon Nanotubes Synthesis in Fluidized Bed Reactor Equipped with a Cyclone

Puguh Setyopratomo[1], Mahmud Sudibandriyo[1]*, Praswasti P.D.K. Wulan[1]

[1]Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia

This work aimed to observe the performance of a fluidized bed reactor which was equipped with a cyclone in the synthesis of carbon nanotubes (CNT) by chemical vapor deposition. Liquefied petroleum gas with a constant volumetric flow rate of 1940 cm^3/minutes was fed to the reactor as a carbon source, while a combination of metal components of Fe-Co-Mo supported on MgO was used as catalyst. The CNT synthesis was carried out at a reaction temperature which was maintained at around 800 – 850 ^oC for 1 hour. The CNT yield was decreased sharply when the catalyst feed was increased. The carbon efficiency is directly proportional to the mass of catalyst fed. It was found from the experiment that the mass of asgrown CNT increased in proportion to the increase of the catalyst mass fed. A sharp increase of the mass percentage of carbon nanotubes entrainment happened when the catalyst feed was raised from 3 to 7 grams. Agglomerates of carbon nanotubes have been formed. The agglomerates composed of mutually entangled carbon nanotubes which have an outer diameter range 8 – 14 nm and an inner diameter range 4 – 10 nm, which confirmed that the multi-walled carbon nanotubes were formed in this synthesis. It was found that the mesopores dominate the pore structure of the CNT product and contribute more than 90 % of the total pore volume.

Keywords:

Bulk Density; Carbon Nanotubes; Chemical Vapor Deposition; Cyclone; Fluidized Bed Reactor

CHE1 - 4

An Assessment on the Effect of Torrefaction as a Pretreatment to Improve the Quality of Pyrolysis Products

Nurhayati Abdullah, Fauziah Sulaiman and Aminu Aliyu Safana

School of Physics, Universiti Sains Malaysia, 11800 USM Pulau Pinang, Malaysia.
nurhaya@usm.my

The purpose of this study is to assess the effect of torrefaction on the pyrolysis product. Biomass samples such as empty fruit bunch (EFB), mesocarp fibre (MF) and palm shell (PKS) were torrefied (treated) and pyrolyzed. The experiment conditions were set to be respectively at 220 ^{o}C of temperature, 10 ^{o}C/min of heating rate and 30 minutes holding time for torrefaction and at 650 ^{o}C of temperature, 20 ^{o}C/min heating rate and 2 hours holding time for pyrolysis. Nitrogen flow rate of 2L/min was maintained for both experiments. The treated sample accommodates high carbon content and low oxygen content than the untreated sample. The pyrolysis of the untreated sample produced a significant amount of bio-oil and gasses, whereas a large amount of biochar was obtained from treated sample. The pyrolysis experimental results showed that all the biochars from treated sample possess high fixed carbon content and higher calorific value (HHV) than the biochar from untreated sample. However, biochar derived from treated shell contained the highest HHV of 31.2 MJkg^{-1} among all the biochars. The bio-oil obtained from pyrolysis of treated sample is less acidic and contain high calorific value compared to bio-oil obtained from the untreated sample. Fibre and shell have shown a better result than EFB after being treated via torrefaction. Therefore, the shell and fibre can be described as the better samples which can undergo torrefaction and pyrolysis than EFB.

Keywords:

Palm waste biomass; Torrefaction; Pyrolysis; Biochar; Bio-oil

Dimetil 9-Oktadekendioate and 9-Oktadecene from Methyl Oleate via Ruthenium-catalyzed Homo Olefin Metathesis Reaction

Ilham Ardatul Putra, Robby Roswanda and Didin Mujahidin*

Division of Organic Chemistry, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung
Jl. Ganesha No. 10 Bandung 40132, Indonesia
Email: didin@chem.itb.ac.id

Oleic acid, one of the major components of palm oil, has attracted many interests in modern oleochemistry. The internal olefin group in oleic acid is a useful functional group in the transformation of fatty acid to other functional chemicals and materials. In this paper, we report the application of olefin metathesis reaction by preparing of a long chain dicarboxylic and alkene from the ester of oleic acid. The internal olefin metathesis reaction of methyl oleate produced dimethyl 9-oktadecendioate and 9octadecene in the presence of ruthenium Grubbs II catalyst with 51% yields, respectively. We also found that the amount of the *E* isomer products is higher than the *Z* isomer products.

Keywords:

Olefin Metathesis, Methyl Oleate, Grubbs II Catalyst, 9-Oktadecene, Dimethyl 9oktadecenedioate

CHE1 - 6

Synthesis and Characterization of Methyltrihydroxysilane Water Repellent

Akhmad Zainal Abidin[1,a], Mega Natalia Harjandi[1], Vincent Wirawan[1], and Sri Mulyani Suharno[1,b]

[1]*Department of Chemical Engineering, Faculty of Industrial Technology, Institut Teknologi Bandung, Jl. Ganesha 10, Bandung 40132, Indonesia*

[a]*mitraiqro@yahoo.com,* [b]*srimulyani.suharno@gmail.com*

Methyltrihydroxysilane ($CH_3Si(OH)_3$) as a water repellent has been synthesized from trichloromethylsilane and ethanol by varying their composition, reaction condition, and the addition of nanosilica. The properties of the material have been characterised using FTIR for identification of raw materials and water repellent product, SEM for identification of water repellent coating surface, and tensiometer for measurement of water repellent contact angle. The FTIR spectra confirms the reaction of the water repellent formation. The water repellent product was applied by spraying or dip coating on automotive window surface. This study shows that the best ethanol composition is 91% and the best contact angle of synthesized water repellent material is 149,46^o. This contact angle is higher than that of a commercial product, which shows it as property of super hydrofobic material. Water repellency properties increase as composition of trichloromethylsilane increases. It shows that the increasing of trichloromethylsilane composition can also increase methyltrihydroxysilane formation. However, glass surface becomes opaque as composition of trichloromethylsilane increase because methyltrihydroxysilane will create Si-O-Si layer that has white color. The addition of nanomaterial also increases the surface roughness, but a binder is required to bind nanomaterial to the water repellent layer. For application, dip coating has better water repellency than spraying. This is because dip coating method create more homogenous nanomaterial precipitation on the surface. On the other hand, the level of transparency is worse. Therefore, the water repellent of trichloromethylsilane is recommended for applicationsthat do not need clarity such glass wall of bathroom.

Keywords:

Contact angle; Methyltrihydroxysilane; Super hydrophobic; Trichloromethylsilane; Water repellent

CHE1 - 7

Formulation Optimization and Characterization of Copolymer Acrylamide-(2-Acrylamido-2-Methylpropanesulfonic Acid) for Enhanced Oil Recovery (EOR)

A. Z. Abidin[1], I. A. Suryawijaya[1], A. Indiarni[1], D. A. Trirahayu[1]

[1]*Department of Chemical Engineering, Faculty of Industrial Technology, Institut Teknologi Bandung, Jl. Ganesa 10 Bandung, Indonesia 40132*

Copolymers have been synthesized from acrylamide (AM) and 2-Acrylamido-2-methyl propane sulfonic acid (AMPS) that will be used for Enhanced Oil Recovery application. The polymerization had been performed for 6 hours at ambient pressure and temperature, using nitrogen as purging gas, with variation of AM:AMPS mass ratio 60:40, 65:35, 70:30, and 75:25. The initiator used in this experiment was a mixture of ammonium persulfate and sodium thiosulfate with a total weight of 0.35% from the monomers total weight. The product of the polymerisation is a gel material that will be dissolved in water and characterized. There are three analysis that performed to characterize the polymerization product: IR spectrum analysis (testing with FTIR), thermal degradation analysis (testing with TGADSC), and viscosity analysis. The results of this study indicate that the best mass ratio formula of AM:AMPS that produces the best viscosity for EOR is 65:35. The synthesized AM-AMPS copolymer solution has good resistance to salt and high temperature but has pseudo plastic properties. Viscosity of the solution decreased every day during storage and stopped declining after 30 days of storage. This characteristic shows suitability of the synthesized AM-AMPS copolymer for EOR applications.

Keywords:

Acrylamide, AMPS, EOR, Salinity, High temperature

CHE2A - 1

Photo-based Advanced Oxidation Processes for Removal of Pharmaceutical Compound in Water

Sandyanto Adityosulindro [1,2], Laurie Barthe [2], Henri Delmas [2], Carine Julcour [2]

[1] *Civil Engineering Department, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok 16424, Indonesia*

[2]*Laboratoire de Génie Chimique, Université de Toulouse, CNRS, INPT, UPS, Toulouse, France*

As a consequence of huge consumption, pharmaceutical compounds have been detected in various water compartments, such as wastewater treatment plant effluents or even drinking water. This fact indicates that conventional processes used in water treatment plants (e.g. chemical precipitation and activated sludge) cannot completely eliminate them. In this study, different photo-based advanced oxidation processes (*i.e.* direct photolysis, UVVis/hydrogen peroxide and photo-Fenton oxidation) were evaluated for the removal of a non-steroidal anti-inflammatory drug, ibuprofen. It was chosen as model pollutant due to its high consumption worlwide. Its degradation was evaluated by HPLC/UV for pollutant conversion and total organic carbon analyzer for mineralization yield. Low pressure (254 nm) and high pressure (200-600 nm) mercury lamps, as well as xenon lamp (360-740 nm) were used to determine the effect of light irradiation wavelength on photo-oxidation processes. Irradiation with high pressure mercury lamp completely converted ibuprofen in 20 mg/L solution within 60 min and yielded up to 45% TOC removal after 3 hours, while pollutant photolysis was only partial at 254 nm and ineffective under visible irradiation. Addition of H_2O_2 considerably improved ibuprofen degradation rate at 254 nm (due to peroxide photolysis leading to $OH^{\bullet}$ radical, while visible light was shown as an efficient activation technique for Fenton oxidation due to photo-regeneration of ferrous ions. In the latter case, final mineralization yield reached 60% in the following conditions: $[H_2O_2]_0$ = 6.4 mM and $[Fe^{2+}]_0$ = 0.134 mM. Evaluation of electrical energy and oxidant consumptions showed that LP Hg lamps are the most cost-effective for photo-based AOPs. Considering the similarity in light spectrum between xenon lamp and sunlight, solar photo-Fenton oxidation also appears as a promising wastewater treatment process for the remediation of pharmaceuticals, especially in tropical countries such as Indonesia.

Keywords:

Water treatment; Light irradiation; Photolysis; Peroxide photo-oxidation; Photo-Fenton; Ibuprofen

CHE2A - 2

Hydrogen Generation by KOH-ethanol Plasma Electrolysis using Double Compartement Reactor

Nelson Saksono[1*], Johannes Sasiang[1], Chandra Dewi Rosalina[1], Trisutanti Budikania[2]

[1]*Department of Chemical Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Politeknik AKA Bogor, Indonesia*
[*] *nelson@che.ui.ac.id*

This study has successfully investigated the generation of hydrogen using double compartment reactor with plasma electrolysis process. Double compartment reactor is designed to achieve high discharged voltage, high concentration, and also reduce the energy consumption. The experimental results showed the use of double compartment reactor increased the productivity ratio 90 times higher compared to Faraday electrolysis process. The highest hydrogen production obtained is 26.50 mmol/min while the energy consumption can reach up 1.71 kJ/mmol H_2 at 0.01 M KOH solution. It was shown that KOH concentration, addition of ethanol, cathode depth, and temperature have important effects on hydrogen production, energy consumption, and process efficiency.

Keywords:

Double Compartment Reactor, Ethanol, Hydrogen, KOH, Plasma Electrolysis

CHE2A - 3

Effects of Absorbent Flow Rate on CO_2 Absorption through Super Hydrophobic Hollow Fiber Membrane Contactor

Sutrasno Kartohardjono[1*], Angeline Paramitha[1], Aulia Andika Putri[1] and Ryan Andriant[1]

[1]*Process Intensification Laboratory, Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI, Depok 16424, Indonesia*
** sutrasno@che.ui.ac.id*

The aim of this study is to evaluate the effects of absorbent flow rate on CO_2 absorption through super hydrophobic hollow fiber contactor. The absorbent use in this study was physical absorbent namely polyethyleneglycol-300 (PEG-300) solution. Meanwhile, the feed gases used in the experiments were pure CO_2 and a mixture of 30% CO_2 and 70% CH_4. Gas absorption using physical absorbent provides benefits such as it can produce sufficiently high selectivity towards CO_2 and less corrosive than the chemical solvents. There are three super hydrophobic hollow fiber contactors sized 6 cm and 25 cm in diameter and length used in this study, which consists of 1000, 3000 and 5000 fibers, respectively. The super hydrophobic fiber membrane used is polypropylene-based with outer and inner diameter of about 525 and 235 µm, respectively. During the experiments, the absorbent was flowed through the lumen fibers, whilst the feed gas flowed through the shell side of the membrane contactors. The experimental results showed that the mass transfer coefficient, the flux and the absorption efficiency increased but the CO_2 loading decreased with the absorbent flow rate in the membrane contactor. Meanwhile, the increase in the number of fibers in the membrane contactor, in general, will increase the absorption efficiency and the CO_2 loading but will decrease the overall mass transfer coefficient and the flux.

Keywords:

Absorption Efficiency; Flux; Mass Transfer Coefficient; Membrane Contactor; Super Hydrophobic

CHE2A - 4

Effects of Feed Gas Flow Rate on CO_2 Absorption through Super Hydrophobic Hollow Fiber Membrane Contactor

Sutrasno Kartohardjono[1*], Kevin Alexander[1], Annisa Larasati[1] and Ivander Christian Sihombing[1]

[1]*Process Intensification Laboratory, Department of Chemical Engineering, Faculty ofEngineering, Universitas Indonesia, Kampus Baru UI, Depok 16424, Indonesia*
** sutrasno@che.ui.ac.id*

Carbon dioxide is pollutant in natural gas that could reduce the heating value of the natural gas and cause problem in transportation due to corrosive to the pipeline. This study aims to evaluate the effects of feed gas flow rate on CO_2 absorption through super hydrophobic hollow fiber contactor. Polyethyleneglycol-300 (PEG-300) solution was used as absorbent in this study, whilst the feed gas used in the experiment was a mixture of 30% CO_2 and 70% CH_4. There are three super hydrophobic hollow fiber contactors sized 6 cm and 25 cm in diameter and length used in this study, which consists of 1000, 3000 and 5000 fibers, respectively. The super hydrophobic fiber membrane used is polypropylene-based with outer and inner diameter of about 525 and 235 μm, respectively. In the experiments, the feed gas was sent through the shell side of the membrane contactor, whilst the absorbent solution was pumped through the lumen fibers. The experimental results showed that the mass transfer coefficient, flux, absorption efficiency for CO_2-N_2 system and CO_2 loading increased with the feed gas flow rate, but the absorption efficiency for CO_2-N_2 system decreased. The mass transfer coefficient and the flux, at the same feed gas flow rate, decreased with the number of fibers in the membrane contactor, but the CO_2 absorption efficiency and the CO_2 loading increased.

Keywords:

Absorption Efficiency; Flux; Mass Transfer Coefficient; Membrane Contactor; Super Hydrophobic.

CHE2A - 5

The Feasibility of using Explicit Method for Linear Correction of the Particle Size Variation using Nir Spectroscopy Combined with PLS2 Regression Method

Meinilwita Yulia[1*], Diding Suhandy[2]

[1]*Department of Agricultural Technology, Lampung State Polytechnic, Jl. Soekarno Hatta No. 10, Rajabasa Bandar Lampung, Indonesia*

[2]*Department of Agricultural Engineering, Faculty of Agriculture, The University of Lampung, Jl. Prof. Dr. Soemantri Brojonegoro No.1, Bandar Lampung, 35145, Indonesia*

** meinilwitayulia@polinela.ac.id*

NIR spectra coming from spectral data acquisition system contains both chemical information of samples as well as physical information of the samples, such as particle size and bulk density. Several methods have been established for developing calibration models that can compensate for sample physical information variations. One common approach is to include physical information variation in the calibration model both explicitly and implicitly. The objective of this study was to evaluate the feasibility of using explicit method to compensate the influence of different particle size of coffee powder in NIR calibration model performance. A number of 220 coffee powder samples with two different types of coffee (civet and non-civet) and two different particle sizes (212 and 500 µm) were prepared. Spectral data was acquired using NIR spectrometer equipped with an integrating sphere for diffuse reflectance measurement. A discrimination method based on PLS-DA was conducted and the influence of different particle size on the performance of PLS-DA was investigated. In explicit method, we add directly the particle size as predicted variable results in an X block containing only the NIR spectra and a Y block containing the particle size and type of coffee. The explicit inclusion of the particle size into the calibration model is expected to improve the accuracy of type of coffee determination. The result showed that using explicit method the quality of the developed calibration model for type of coffee determination is a little bit superior with coefficient of determination (R^2) = 0.99 and root mean square error of crossvalidation (RMSECV) = 0.041. The performance of the PLS2 calibration model for type of coffee determination with particle size compensation was quite good and able to predict the type of coffee in two different particle sizes with relatively high R^2_{pred} values. The prediction also resulted in low bias and RMSEP values.

Keywords:

Calibration Model; Explicit Method; NIR Spectroscopy; PLS2 Regression; PLSDA; Specialty Coffee

CHE2A - 6

The Effect of Hydrochloric Acid Addition to Increase Carbon Nanotubes Dispersibility as Drug Delivery System by Covalent Functionalization

Praswasti Pembangun Dyah Kencana Wulan[1,3], Sekar Hanun Ulwani[2], Hanifia Wulandari[2], Widodo Wahyu Purwanto[3], Kamarza Mulia[3]

[1]Member of Research Center for Biomedical Engineering, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia
[2]Member of Sustainable Energy Laboratory, Chemical Engineering Department, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia
[3]Chemical Engineering Department, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia

Carbon nanotubes (CNT) has unique properties as a new promising candidate for cancer multifunctional drug delivery system. CNT can load big amounts of cancer drug molecules with less dosage and equipped with cell-targeting agent to increase target accuracy These can minimize the potential of healthy cells damage around the cancer. Functionalization needed to improve the dispersibility of CNT as a drug delivery. Functionalization in this study is a covalent functionalization with acid to oxidize the surface of CNT. This study is to obtain the effect of adding hydrochloric acid (HCl) to the mixture of sulfuric acid (H_2SO_4) and HNO_3. HCl expected to increase the dispersibility of functionalized CNT by improving the dispersion time period done with H_2SO_4 or HNO_3. Functionalization used mixture of H_2SO_4 and HNO_3 with volume ratio of 3:1. Covalent functionalizations used 0.5 grams of MWCNT ultrasonicated in 50mL HNO_3 and mixture of HNO_3 and H_2SO_4. Additions of 200 mL HCl used variation of molarity from 1M, 2M, 3M, 4M, 5M to 6M. CNT were oxidized to form carboxylic and hydroxyl bonds on the surface that increase dispersibility of CNT. Fourier Transform Infrared (FTIR) spectrums showed the existences of carboxyl and hydroxyl group on spectra of 2600-3700 cm^{-1} and 900-1400 cm^{-1}. Dispersion tests, which showed functionalized CNT (f-CNT) dispersion capabilities, were done by dissolving f-CNT in water. The study resulted that 6M f-CNT (NSC6) gave the best dispersion with zeta potential value of -37.1 mV. NSC6 gave the longest dispersion time which was 20 days until f-CNT settle again. Scanning Electron Microscopy-Energy Dispersive Spectroscopy (SEM-EDS) micrographs showed the surface structure of 6M fCNT without significant damage and no longer contain impurities of Fe, Ni, and Cl.

Keywords:

Acid; Carbon nanotubes (CNT); Dispersibility; Drug Delivery; Covalent Functionalization

CHE2A - 7

CFD Study of Mixing Miscible Liquid with High Viscosity Difference in a Stirred Tank

Suci Madhania[1,2], Anugrah Budi Cahyani[2], Tantular Nurtono[2], Yuswan Muharam[1], Sugeng Winardi[2], Widodo Wahyu Purwanto[1*]

[1]*Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

[2]*Department of Chemical Engineering, Faculty of Industrial Technology, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo, Surabaya 60111, Indonesia*

The mixing process of miscible liquids with high viscosity difference is crucial role even though the solution mutually dissolved. This paper describes the mixing behaviour of the water-molasses system in a conical-bottomed cylindrical stirred tank (D = 0.28 m and H = 0.395 m) equipped with a side-entry Marine propeller (d = 0.036 m) under the turbulence regime using a three-dimensional and transient CFD-simulation. The objective of this work is to compare the solution strategies was applied in the computational analysis to capture the detail phenomena of mixing two miscible liquid with high viscosity difference. Four solution strategies that have been used are the RANS Standards k-ε (SKE) model as the turbulence model coupled with the Multiple Reference Frame (MRF) method for impeller motion, the RANS Realizable k-ε (RKE) combine with the MRF, the Large Eddy Simulation (LES) coupled with the Sliding Mesh (SM) method and the LES-MRF combination. The transient calculations were conducted with Ansys Fluent 17.1 version. The mixing behaviour and the propeller characteristic are to be compared and discussed in this work. The simulation results show the differences of flow pattern and the molasses distribution profile for every solution strategy. The variation of the flow pattern which happened in each solution strategy showing an instability of the mixing process in stirred tank. The LES-SM strategy shows the realistic direction of flow than another solution strategies.

Keywords:

High Viscosity Difference; Miscible Liquid; Multiphase Flow; Side-Entry; Turbulence Model

CHE2A - 8

The Effect of Anionic and Nonionic Co-surfactant for Improving Solubility of Polyoxy-based Surfactant for Chemical Flooding

Yani F. Alli[a]*, Dadan Damayandri[a], and Yan Irawan[b]

[a]Research and Development Centre for Oil and Gas Technology "LEMIGAS" Jl. Ciledug Raya Kav.109, Cipulir, Kebayoran Lama, P.O. Box 1089/JKT, Jakarta Selatan Tromol Pos: 6022/KBYB-Jakarta 12120, Telephone: 62-21-7394422, Fax: 62-21-7246150

[b]Research Centre of Chemistry, Indonesian Institute of Sciences Kawasan PUSPIPTEK Serpong, Tangerang – Banten, 15314 Telephone: 021 – 7560929, Fax: 021 – 7560549

faozani@lemigas.esdm.go.id

Surfactant is one of the crucial components for chemical flooding to recover oil production in the tertiary stage owing to the inefficiency of the conventional primary and secondary recovery that yields only 20-40% of the OOIP (original oil in place) as incremental oil. The mechanism includes decreasing interfacial tension (IFT), increasing capillary number, as well as enhancing microscopic displacement efficiency. The present study showed the effect of commercial nonionic and anionic co-surfactant Tergitol, Teepol, Merpol and SDS on the solubility of POS through compatibility analysis, filtration ratio analysis, and IFT measurement. Whereas the presence of Teepol and Merpol did not change the original compatibility of polyoxy based-surfactant (POS) in all concentrations, the addition of cosurfactant Tergitol and SDS were able to alter the solubility of POS into a clear transparent solution. However, the most important characteristic of surfactant for reducing the IFT of oil-water was affected by the addition of co-surfactant which does not have sufficient IFT to release the trapped oil in the reservoir. Thus, exposing the mixture of surfactant and cosurfactant for a few days at the reservoir temperature has changed the visual appearance of solution from a clear transparent solution into a milky suspension, indicating the occurrence of thermal hydrolysis. These results suggest that the addition of anionic and nonionic co-surfactant improved the solubility of POS, but increased the IFT. It can be concluded that the compatibility of POS in the brine can then be achieved by mixing it with suitable co-surfactant. However, screening the other co-surfactant is required to obtain the one that enhances the compatibility as well as maintaining the ultralow IFT of POS.

Keywords:

Polyoxy-Based Surfactant; Enhanced Oil Recovery; Chemical Flooding; Solubility; Co-Surfactant

CHE2B - 1

Development Method of Making Dye Sensitized Solar Cell (DSSC) using Carbon as Counter Electrode

Wisnu Ananda[a], Anies Mutiari[a], Pramujo Widiatmoko[b]

[a]Center for Material and Technical Product, Ministry of Industry of Indonesia, Jl Sangkuriang 14 Bandung West Java, Indonesia
[b]Department of Chemical Engineering, Institute Technology Bandung, Jl. Ganesha 10 Bandung West Java, Indonesia

Dye Sensitized Solar Cell (DSSC) is known as one of the promising third generation types of solar cell which is being developed nowadays. The main challenge on the development of DSSC is to increase solar-electricity conversion efficiency. To reduce cost of cell, Ptbased counter electrode needs to be substituted with carbon. It is identified that structure of electrode affects to DSSC performance. Hence, electrode deposition method is important. Our study therefore identifies effect of electrode preparation method on the performance of DSSC. The method will be important for scaling-up the cell size. Working and counter electrode were prepared from TiO_2 and activated carbon, respectively. Both TiO_2 and activated carbon were coated on transparent conductive glass using two methods, i.e. bar coating and doctor blade coating. Eosin yellowish and iodide-triiodide redox couple were used as dye and electrolyte, respectively. Crystalline structure of TiO_2, surface area of carbon particles, and electrochemical properties were examined using X-ray diffractometer, surface area analyzer, and electrochemical impedance spectroscopy. We found that doctor blade coating method provide higher performance of DSSC compared with bar coating. The efficiency of prepared DSSC reached 2.76%.

Keywords:

Solar Cell; Dye Sensitized Solar Cell; Carbon; Counter Electrode; Bar Coating; Doctor Blading

CHE2B - 2

Characterisation of Activated Carbon as a Support to Zinc Oxide Catalyst for Ozone Decomposition in Effluent Gas Emission

A Pradyasti[1]*, A S Azhariyah[1]*, S Bismo[1]

[1]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

Investigation of catalyst for ozone decomposition in effluent gas emission was carried out by using zinc oxide (ZnO) and granular activated carbon (GAC) as a support. Ozone need to be decomposed because it is harmful to human and can lead to death. Before GAC was used as a support, GAC was prepared by using chloride acid (HCl) and sodium hydroxide (NaOH). With this pre-treatment, impurities were removed and specific surface area of activated carbon was increased. ZnO was impregnated to the surface of GAC by using aqueous zinc carbonate ($ZnCO_3$) as precursor and then ZnO was calcinated to decompose carbon dioxide (CO_2) with temperature of 300 °C for 2 hours. Size of GAC and loading percentage of ZnO to the support were varied to get the optimum value. Size of GAC was varied between 18-100 mesh and loading percentage was between 0-2 %-wt. The morphology, composition, and crystal phase were characterized by BET, scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDS), and X-ray diffraction (XRD) method. From XRD method, crystal phase of catalyst was changed from $ZnCO_3$ to ZnO when calcinated with exact temperature. Ozone decomposition was performed at room temperature and atmospheric pressure using packed bed reactor. Result of catalytic ozone decomposition was analyzed using iodometric titration with presence of acid which used sulfonic acid (H_2SO_4). GAC with smallest size (60-100 mesh) and highest loading percentage (2 %-wt) showed the highest activity which the conversion reached 100%. GAC with smallest size and highest loading percentage had the widest pore volume (0.478 cm^3/g) and pore volume affected the amount of ZnO on the surface of GAC when ZnO was impregnated. Amount of ZnO on the support also determined the efficiency of catalyst because appropriate amount of ZnO maintained the morphology and crystal phase of the catalyst.

Keywords:

Activated Carbon; Catalytic Ozone Decomposition; Ozone; Zinc Oxide

CHE2B - 3

Emulsion Stability of Fungicide from Eugenol and Citronella Oil in 350 EC Formulation

Yenny Meliana[a], Savitri[a], Melati Septiyanti[a], Feni Amriani[a], Syahrul Aiman[a], Veny Luvita[b]

[ba]*Research Research Center for Chemistry, Indonesian Institute of SciencesCenter for Metrology, Indonesian Institute of Sciences*

The emulsion stability of fungicide formula from eugenol and citronella oil had been studied. Eugenol and citronella are well known as active ingredients from clove and lemongrass oil, respectively. Their ability for fungus removal had been well recognized. Eugenol and citronella dissolved imperfectly in pegasol and ethanol, thus emulsifier surfactants are required to form an emulsion system of fungicide formula. Polyethylene glycol mono oleate (PMO) as non-ionic surfactants and methyl ester sulfonate (MES) as an-ionic surfactants are employed in present study. The emulsion system has the optimum stability in addition of surfactants ratio, PMO and MES, at 9:1 respectively. Moreover, the dispersion phase of these compounds (in 350 EC) is stable in emulsion system for 180 minutes. Further study, as the application, the performance and residues in plants, waters, and soil of pesticide's current formulation will be evaluated to acquire more valuable data which support the pesticide potential application.

Keywords:

Emulsion Stability; Fungicide Formula; Eugenol; Citronella; Emulsifer Surfactants

CHE2B - 4

Study on Physicochemical Evolution of Silica in the Preparation of TiO_2-SiO_2 Aerogel From Bamboo Leaves for Dye Photoxidation Application

Is Fatimah[1]*, Lusi Sopia[1], Andita Ainun Naafi[1], Dikha Utami Trisnawati[1], Sim Yoke Leng[2]

[1] Chemistry Department, Universitas Islam Indonesia, Kampus Terpadu UII, Jl. Kaliurang *Km 14, Sleman, Yogyakarta, Indonesia 55584*

[2]Chemical Sciences Department, Universiti Tunku Abdul Rahman, Perak, Malaysia

*isfatimah@uii.ac.id

Preparation of photocatalyst material, TiO_2-SiO_2 using Bamboo leaves as silica source has been investigated. Silica was extracted from Bamboo's leaves ash and composit was conducted using varied titanium precursors; titanium isopropoxide and titanium butoxide. Prepared materials were characterized by using XRD, SEM-EDX, BET Methode and photocatalytic activity of the material was examined in methylene blue (MB) photooxidation under bacth photocatalytic reactor. Photocatalytic activity of the materials was tested in MB photooxidation. The results showed the significant photoactivity as indicated by the degradation rate of methylene blue at varied time of treatments. The results suggest that the composite is potential to be developed for Batik's industry wastewater.

Keywords: -

CHE2B - 5

The Investigation of Influence Ammonia Concentration Variations to the Performances of a Pump Less Ammonia-Water Absorption Refrigeration System with Water Flooding Evaporator

Hendra Wijaksana, Nengah Suarnadwipa, Ketut Astawa

Mechanical Engineering Department,Engineering Faculty, Udayana University
Kampus Bukit Jimbaran ,Denpasar, Bali
Email : hendrawjks@gmail.com. Telp. 0361 703321

An experimental investigation of the influences ammonia concentration variation to the performances of pump less ammonia-aqua absorption refrigeration system with water flooding evaporator is described. The heat generated in generator and refrigerating effect in evaporator, cooling capacity, coefficients of performance (COP) are investigated. The objective of this study is to investigate the characteristic and influences of the ammonia concentration variation to the performance of pump less absorption refrigeration system with water flooding evaporator as a refrigeration load.. In this research, the generator temperature has been setting constant in 80^0C using electric heater, the ammonia concentration in 500 ml solution would be varied in 18%, 27%, 37%, 47%, and 59%. It is concluded that heat generated in generator and refrigerating effect in evaporator decrease with increasing ammonia concentration, while the cooling capacity and COP would increase with increasing ammonia concentration. As a result, it is found that increasing the ammonia concentration would effect on increasing of cooling capacity and COP. The highest the ammonia concentration, the highest cooling capacity and COP would be resulted. The highest cooling capacity and COP resulted respectively are 0.7180 kW and 0.829 at 59% ammonia concentration.

Keywords:

Ammonia concentration variation, mass ammonia-water ratio, pump less absorption refrigeration system, water flooding evaporator

CHE2B - 6

Mechanical Properties Of Carboxymethyl Cellulose-Oleic Acid Solid Biopolymer Electrolyte

M. N. Chai[1,*], M. M. Chai[2] and M. I. N. Isa [1]

[1]Advanced Materials Team, Ionic State Analysis (ISA) Laboratory, School of Fundamental Science, Universiti Malaysia Terengganu, Kuala Nerus 21030, Terengganu, Malaysia
[2]Faculty of Engineering, Universiti Malaysia Sarawak, 93100 Kuching, Malaysia

In this paper, the mechanical properties of carboxymethyl cellulose-oleic acid (CMC-OA) solid biopolymer electrolyte (SBE) were examined. The host, CMC was doped with different weight percentage (wt. %) of OA in the CMC-OA solution. The SBEs were tested by using the Universal Material Testing Machine where the readings of tensile strength and Young's modulus can be obtained from the stressstrain curve produced by the software during the tension test. The sample of CMC doped with 20% wt. of OA was found to obtain the highest value of tensile strength and Young's modulus which is 0.2069 MPa and 4.615 MPa respectively.

Keywords:

Carboxymethyl Cellulose; Oleic Acid; Bio-Polymer; Mechanical; Conductivity

CHE2B - 7

MONOGLYCERIDE CONTENTS IN BIODIESEL FROM VARIOUS PLANTS OIL AND THE EFFECT TO LOW TEMPERATURE PROPERTIES

Lies Aisyah[1], Cahyo S. Wibowo[1], Sylvia A. Bethari[1], Dziki Ufidian[1, 2], Riesta Anggarani[1]

[1]*Research and Development Center for Oil and Gas Technology "LEMIGAS", Jakarta*
[2] *Chemical Engineering Dept. of Universitas Indonesia, Depok, Indonesia*

Monoglyceride is a by-product component of biodiesel consisting from glyceride molecules that attached to one molecule of fatty acid. Monoglyceride content relates to sedimentation problem encountered at storage or handling facilities of biodiesel especially at low temperature environment. To prevent the sedimentation or blocking problem in fuel filter of vehicles using biodiesel-diesel fuel blends, then it is necessary to limit the monoglyceride content in biodiesel. The factor affecting monoglyceride content in biodiesel is the transesterification reaction converting the fatty acid into methyl ester compound. The fatty acid compounds in plant oil vary in a wide range, depends on the plant used to produce the oil. In order to fulfill national demand and for the reason of energy diversification, many plants are now under study by the researcher to investigate their potentiality for biodiesel production. In this study, we focus on investigate the monoglyceride content in biodiesel made from 4 plant oils; kemiri sunan (*Reutealis trisperma*) oil, coconut oil, nyamplung (*Calophyllum inophyllum*) oil, and waste cooking oil. These oils are purified and checked for its critical characteristics then converted to biodiesel through transesterification reaction in laboratorium scale. The process condition are optimized to get the highest yield of conversion. The biodiesel produced from the optimized process then tested for its physical and chemical characteristics refer to Standard National of Indonesia for biodiesel (SNI 7182:2015). The monoglyceride content of the biodiesel from kemiri sunan (*Reutealis trisperma*) oil, coconut oil, nyamplung (*Calophyllum inophyllum*) oil, and waste cooking oil, are 8.86%, 0.69%, 4.0%, and 2.69% consecutively. The low temperature properties represented by viscosity (@40 ^{0}C) for the 4 samples in the same order as before are 6.1 cSt, 2.7 cSt, 4.71 cSt, and 4.90 cSt. The cloud point that indicate the tendency of precipitation in low temperature also measured with the result of 3^{0}C, -2^{0}C, -6^{0}C and 3^{0}C consecutively. The conclusions indicate that monoglyceride content relate directly with the degree of transesterification process and affecting the low temperature properties of biodiesel.

Keywords:

Biodiesel, Low Temperature Properties, Monoglyceride, Transesterification

CHE2B - 8

Synthesis an Characterization of Cellulose Acetate from Natural Fiber As Subtitute Microbeads Polyethylene that more Environmental Friendly

Dian Purwitasari Dewanti[1], Dewi Tristantini[1] and Eny Kusrini[1]

[1] *Universitas Indonesia*

Cellulose acetate made by acetylation between cellulose and acetic acid anhydrous. Cellulose extracted from empty palm oil bunches (EPB) and leaves dry jackfruit leaves (DJL) through delignification process with NaOH 8, 10,12, and 14 % then continued with bleaching using H_2O_2 10%. Reaction asetilasi use special variable the ratio between a reactant cellulose and acetic acid anhydrous of 1/5, 1/10, 1/15, and 1/ 20 (v/v) and obtained the highest yields 16,2% to EPB and 42,72% DJL. The success of making cellulose acetate analyzed acetyl group with Fourier Transform Infra Red (FTIR) and morphology with scanning electron microscopy (SEM). As an alternatif to substitute *microbeads* environmentally friendly, then cellulose acetate and *microbeads* measured of weight relegated with the burial.Degradation cellulose acetate reached 69 % to EPB and 63,2 % to DJL to 20^{th} day.

Keywords:

Acetilation, Jackfruit, Microbeads, Cellulose, Cellulose Acetate, EPB

Ferrous and Aluminium Cations Removal in Acid Mine Drainage using Powdered Activated Carbon Ceramic Adsorbent

[1]Tine Aprianti, [1]Siti Miskah, [1]Selpiana and [1]Subriyer Nasir

[1]Universitas Sriwijaya, Chemical Engineering Department,
Jl. Raya Palembang-Prabumulih KM.32, Inderalaya 30662, Indonesia

Powdered activated carbon (PAC) usage as adsorbent is very common nowadays, but it has a very light structure which makes it easily carried out in liquid stream during or after the adsorption process. This research provides a method to combine PAC with clay and modify them into ceramic adsorbent, the combination is molded into small balls and then baked in a furnace with a very high temperature in the range of 1000-1300^{o}C. PAC has been known for so many years as an effective adsorbent, but its usage to adsorb heavy metals in acid mine drainage needs improvements for better result, chemical activation is one of the methods should be applied to enhance its adsorption capacity. The adsorbent is activated using alkali solution of NaOH 48% to fill its negative charge to build its ability in binding heavy metallic cations contained in acid mine drainage. This research has proved that the adsorbent used is able to reduce heavy metals pollutant in acid mine drainage, its adsorption capacity reaches most favorable results for Fe is 60.87% and Al is 52.13% at PAC:clay ratio 45:55 on 10 h contact time. This may have proved that the PAC ceramic adsorbent can be used as an effective method to solve acid mine drainage problem.

Keywords:

Acid mine drainage; Powdered activated carbon; Adsorption; Clay; Ceramic adsorbent

CHE3A - 2

Preparation of Hollow Mesoporous Carbon Spheres and Their Performances for Electrochemical Applications

Teguh Ariyanto[1,2*], Gui-Rong Zhang[2,3], Andreas Kern[2], Bastian J.M. Etzold[2,3]

[1]Department of Chemical Engineering, Universitas Gadjah Mada, Jl Grafika 2, 55281 Yogyakarta, Indonesia
[2]Lehrstuhl für Chemische Reaktionstechnik, Friedrich-Alexander-Universität Erlangen-Nürnberg, Egerlandstrasse 3, 91058 Erlangen, Germany
[3]Ernst-Berl-Institut für Technische und Makromolekulare Chemie, Technische Universität Darmstadt, Alarich-Weiss-Strasse 8, 6428 Darmstadt, Germany
**teguh.ariyanto@ugm.ac.id*

Hollow carbon materials have received much attention for energy storage/conversion applications due to their attractive properties of high conductivity, high surface area, large void and short diffusion pathway. In this work, a novel hollow mesoporous material based on carbide-derived carbon (CDC) is presented. CDC is a new class of carbon material synthesized by the selective extraction of metals from metal carbides. With a two-stage extraction procedure of carbides with chlorine, firstly hybrid core-shell carbon particles were synthesized i.e. mesoporous/graphitic carbon shells covering microporous/amorphous carbon cores. The amorphous cores were then selectively removed from particles by a careful oxidative treatment utilizing its low thermal characters while the more stable carbon shells remained, thus resulting hollow particles. The characterization methods (e.g. N_2 sorption, Raman spectroscopy, temperature-programmed oxidation and SEM) proved the successful synthesis of the aspired material. In electric double-layer capacitor (EDLC) testing, this novel hollow core material showed a remarkable enhancement of EDLC's rate handling ability (75% at a high scan rate) with respect to an entirely solid-mesoporous material. Furthermore, as a fuel cell catalyst support the material showed higher Pt mass activity (a factor of 1.8) compared to a conventional carbon support for methanol oxidation without noticeably decreasing activity in a long-term testing. Therefore, this carbon nanostructure shows great promises as efficient electrode materials for energy storage and conversion systems.

Keywords:

Carbide-Derived Carbon, Electric-Double Layer Capacitors, Hollow Carbon Spheres, Methanol Oxidation

CHE3A - 3

Reaction Product of Pyrogallol with Methyl Linoleate and its Antioxidant Potential for Biodiesel

Hery Sutanto, Luthfiyah Ainny, Lukman, Bambang Heru Susanto*, Mohammad Nasikin

Chemical Engineering, Department of Chemical Engineering, Universitas Indonesia, Depok 16424, Indonesia

The demand of biodiesel as an alternative fuel is increasing due to fossil fuel depletion. Biodiesel is a renewable diesel fuel in the form of fatty acid methyl ester or FAME as a result of an esterification of plant oils in a presence of catalyst. Compared to the conventional diesel fuel, biodiesel is more biodegradable, has higher lubricity, and lower toxic emissions. However, the high content of unsaturated fatty acid leads to a problem that biodiesel is prone to oxidation during storage period. This oxidation instability causes degradation of fuel quality and will affect engine performance. Pyrogallol and other phenolic derivatives have been used as the antioxidant additives to prevent biodiesel oxidation. As reported in many researches, pyrogallol is one of the best phenolic antioxidant. However, its low solubility in biodiesel needs an attention. Several reports indicate the increasing solubility of pyrogallol using molecule modification with the addition of alkyl groups to its benzene ring via electrophilic substitution. This paper discusses the idea about modification of pyrogallol molecule and methyl linoleate using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical in order to increase its solubility in biodiesel while keeping its antioxidant property. Three responses were analyzed to examine the antioxidant activity: iodine value, viscosity, and color intensity. The result shown that the addition of 0.1% reaction product exhibit antioxidant activity in biodiesel.

Keywords:

Antioxidant; Biodiesel; DPPH; Methyl Linoleate; Pyrogallol

CHE3A - 4

Utilization of Fruit Waste as Biogas Plant Feed and its Superiority Compared to Landfill

Teguh Ariyanto[1,2*], Abby Vente[3], Rochim Bakti Cahyono[1,2], Stijn Mattheij[3], Ria Millati[4], Sarto[1,2], Siti Syamsiah[1,2]

[1]Department of Chemical Engineering, Universitas Gadjah Mada, Jl Grafika 2, 55281 Yogyakarta, Indonesia
[2]Waste Refinery Center, Faculty of Engineering,Universitas Gadjah Mada, Jl Grafika 2, 55281 Yogyakarta, Indonesia
[3]Environmental Science for Sustainable Energy and Technology, Avans Hogeschool, Lovensdijkstraat 63, 4818 AJ Breda
[4]Department of Food and Agricultural Product Technology, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia
** teguh.ariyanto@ugm.ac.id*

Fruit wastes are one of a major fraction of municipal solid waste. In center of Java they are mainly supplied from the “Gemah Ripah” fruit market, one of the biggest markets selling various fruits for D.I. Yogyakarta and surrounding provinces. This market produces rotten fruits in the range of 4-20 tons/day depending on the season which have to be disposed in a landfill site as a waste. To utilize this valuable renewable resource, a biogas plant has been built to convert the rotten fruit to biogas. This usable gas then is converted to electricity. This paper describes a comprehensive study to setup and manage of the utilization fruit wastes for production of biogas. Firstly, characteristics (type and composition) of waste produced were systematically evaluated followed by the laboratory experiments of biogas conversion to explore gas production from fruit wastes. The biogas plant was designed based on this basic information. The comparison of the biogas plant with the landfill of Yogyakarta is studied using life cycle assessment (LCA) to determine environmental impacts and economic evaluation to assess daily processing costs. From the characterizations of fruit stocks, the results showed that three main components of fruits types were orange (64%), mango (25%) and apple (5%). The rotten fruits contribute 80% of total waste in the market. Based on the experiment, the potential gas production in the biogas plant is approximately 1075 Nm^3 based on 10 ton/day of fruit waste with 54% methane. The biogas plant is in cases, LCA and the daily operational costs, a better option to utilize fruit wastes compared to landfill.

Keywords:

Biogas, Fruit waste, Life cycle assessment

CHE3A - 5

The Study of Waste Plastic Pyrolysis using Natural Zeolite-Bentonite Catalyst

Govinda Aris Saputra[1], Chandra Wahyu Purnomo[1,3]*, Hary Sulistyo[2]

[1]Advanced Materials and Mineral Processing Research Group, [2]Proces System engineering and Product Design Research Group, Chemical Engineering Dept. Universitas Gadjah Mada, Jalan Grafika no 2, 55281 Yogyakarta Indonesia.
[3]Renewable Energy and Waste Utilization Division PIAT UGM, Berbah Sleman Yogyakarta Indonesia

Pyrolysis is one of plastic waste processing methods which requires low treatment temperature with ease of handling. The process will produce three phase of products which are flammable gas, liquid fuel and char. However, the liquid product is still consider as low grade fuel and cannot be used directly. To improve the liquid product quality, many type of catalysts have been used. In this study, zeolite based catalyst was used after being pelletized using bentonite as the binder in a batch pyrolytic reactor. The kinetic study was done to formulate the chemical reaction equation of polypropylene (PP) waste under pyrolysis. The reaction was done at different temperature i.e. 400, 450 and 500 ^{o}C and different catalyst and plastic waste weight ratio i.e. 10% and 30% and also zeolite to binder ratio variation. The liquid product ratio, calorific value of the liquid fuel and also chemical contents in different operating condition were analyzed. This effort aims to select an optimum catalyst type based on natural zeolite for PP pyrolysis to be used for an efficient liquid fuel production. It is shown that the catalyst can shift the solid product into the liquid and gas product and increase the clarity and caloric value of the liquid product. Higher processing temperature produces larger liquid product while the usage of catalyst also enhance the liquid product properties and also quantity.

Keywords:

Catalytic Pyrolysis; Polypropylene; Natural Zeolite

CHE3A - 6

Modeling of a Reactor- Distillation Column-Recycle System to Produce Dimethyl Ether Through Methanol Dehydration

Yuswan Muharam, Lisa Marie Zulkarnain and Andrey Sapati Wirya

Department of Chemical Engineering, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia

The research aims to obtain the mathematical model of a heterogeneous fixed-bed reactor integrated with distillation columns to produce dimethyl ether from methanol. A recycle stream was incorporated to increase dimethyl ether yield. The phenomenological model of the reactor was developed considering interstitial and internal mass transfers. In order to decrease the calculation time, a shortcut model of distillation columns was used. For the same reason, the reactor was considered to be isothermal. The operating condition and parameters in this study were the reactor length of 4 meters, the reactor inlet pressure of 18 atm, the reactor inlet temperature of 533 K, the reactor inlet velocity of 0.408 m/s, and the distillation pressure of 8 atm. Under these condition and parameters, 10.7 moles/s of dimethyl ether is produced, with the dimethyl ether yield of 48% and the methanol conversion of 90%. The incorporation of recycle stream increases the yield by 8%.

Keywords:

Dimethyl ether; Distillation column; Fixed-bed reactor; Methanol; Recycle

CHE3B - 1

Hazard Identification of Primary Cooling System G.A Siwabessy Reactor

Ratih Luhuring Tyas, Geni Rina Sunaryo, Heri Hermansyah*

National Nuclear Energy Agency, University of Indonesia
heri.hermansyah@ui.ac.id

The research reactor has lower hazard potential than the power reactor. However, most research reactor was built a few decades ago, when the design requirement was not completely fulfilled the safety requirement as well as the Reaktor Serba Guna G. A Siwabessy (RSG – GAS) that has been operating for 28 years and located close to the housing resident. Learning from Fukushima accident, it is necessary to assess the safety analysis of RSG – GAS. The safety analysis including the identification of potential hazard, characterization of the postulated initiating event, determination of failure probability, and measuring the frequency. This paper will be focused on hazard identification of the primary cooling system. The worst effect, as a result of the failure of primary system, because of the fuel of the reactor melts. Based on identification and hazard analysis of the primary cooling system using HAZID (Hazard Identification) and HAZOP (Hazard and Operability Analysis) method, there are five initiating events : loss of coolant accident (LOCA) because the leakage of the primary coolant boundary beyond the isolation valves, LOCA because the rupture of a pump casing due to impeller failure, LOCA because heat exchanger leakage, loss of flow accident (LOFA) because the loss of primary pump, and LOFA because the inadvertent closure of the primary isolation valves.

Keywords:

Accident; Hazard; Primary cooling system; Safety

CHE3B - 2

Optimization of LNG Regasification Plant Using Model Predictive Control

Abdul Wahid[1] and Ferdi Fajrian Adicandra[2]

[1,2]Sustainable Energy Research Group, Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia
Corresponding Author: [1]wahid@che.ui.ac.id; [2]ferdi.fajrian@ui.ac.id

Optimization of liquified natural gas (LNG) regasification plant is important to minimize costs, especially operational costs. Therefore, it is important to select the LNG regasification plant design and obtain optimum operating conditions while maintaining the optimum operating conditions through the implementation of model predictive control (MPC). The optimal criterion is the minimum amount of energy used and or the integral of square error (ISE). As a result, the optimum design is to use scheme 2 with an energy savings of 40%. While the optimum operating conditions occur if the vaporizer output temperature is 6^{o}C. In order to maintain the optimum conditions, MPC is required with parameter setting P (prediction horizon), M (control horizon) and T (sampling time) as follows: tank storage pressure controller: 90, 2, 1; product pressure: 95, 2, 1; temperature vaporizer: 65, 2, 2; and temperature heater: 35, 6, 5, with ISE value at set point tracking respectively 0.99, 1792.78, 34.89 and 7.54, or improvement of control performance respectively 4.6%, 63.5%, 3.1% and 58.2% compared to PI controller performance. The energy savings that MPC controllers can make when there is a disturbance in sea temperature rise of 1^{o}C is 0.02 MW and MPC controller also reduces error to product quality by 34.25% compared to the PI controller.

Keywords:

Control, Optimization, Predictive, Regasification, Re-Identification

CHE3B - 3

The Impact of Financing Investment Scenarios on Natural Gas Price through Pipeline for Household in Indonesia

Aji Agraning Bawono[1], Eny Kusrini[1*]

[1]*Department of Chemical Engineering, Faculty of Engineering Universitas Indonesia, Kampus Baru UI, Depok 16424*
**Corresponding Author: Tel.: 62-21-7863516 Ext. 204; fax: 62-21-7863515;*
E-mail: ajiagraningbawono@yahoo.com, ekusrini@che.ui.ac.id

The objective of this study is to compare the impact of financing scenarios on natural gas price through the pipeline for the household in Indonesia with different investment scenarios from the government, business entities, and the mix. Model of Cash Flow simulations based on a case study of setting domestic gas prices in City X that was originally only used one formula investment scheme; then it was developed models and methods for various investment scenarios. A sensitivity test was performed using the development of models to observe the effects of changes in each component of the variable to another variable of the amount of the price calculation of natural gas. For investment funding scenario from the Government, the price was formulated by management fee systems. While the scenario was funding 100% from the investment independently, the prices were formulated with Internal Rate of Return (IRR) = Weighted Average Cost of Capital (WACC) methods, and for the mixed scenario, the price was expressed by modifying the previous calculation formula. Setting the price of natural gas through pipes to Household equitable, fair, transparent and able to meet the people's purchasing power following the investment scheme was studied. From the calculation and simulation, it can be concluded that the investment of government financing scenarios entirely provides the lowest gas prices, but it is still burdening the state. Independent investment provides high gas prices; it is benefiting the firm but not the communities. We recommend for mixed investment scenario in setting gas prices to increase the investments and also public welfare to meet the principles of justice, fairness and meet the people's purchasing power.

Keywords:

Household, Investment Scenarios, Natural Gas, Pipeline, and Price

CHE3B - 4

Extraction of Nickel from Laterite Using Phytic Acid and Salicylaldoxime

Agustino Zulys*, Fajar Prihatno, Afip Jaya Saputra

Department of Chemistry University of Indonesia

Kampus Baru FMIPA UI Depok 16424 Depok

Laterite mineral from west Sulawesi contain chlorite, pyroxene, talc, quartz, olivine and amphibole and it has low grade nickel contain up to 0.93%. In this research, we develop a method for extraction of nickel laterite using phytic acid and salicylaldoxime. The analytical methods to measure nickel contain and ratios of metal to ligand are used by mean of FTIR, UV-vis spectrophotometer. The heap leaching process was done using 25 g of laterite in variation of sulfuric acid and hydrochloric acid concentration. Results heap leaching has yellowish green color indicate the contamination of iron ion. The existence of Fe^{3+} interfere the extraction of Ni^{2+} by salicylaldoxime. The use of phytic acid will lead to iron precipitation, minimizing the iron content. It turned out that optimum concentration of sulfuric acid is 0.5 M yielded 56.01% of nickel extraction, whereas the optimum concentration of hydrochloric acid is 5 M yielded 14,63% of nickel extraction. Then liqud-liquid extraction of Ni^{2+} was carried out using salicylaldoxime in toluene, and yielded 18.88 % of Ni^{2+}. It concluded that the use phytic acid increase the yield of nickel content and the use of sulfuric acid is more efficient than hydrochloric acid.

Keywords:

Extraction, Laterite, Heap Leaching,Phytic Acid, Salicylaldoxime

CHE3B - 5

Crystal-Growth Kinetics of Magnetite (Fe_3O_4) Nanoparticles Using Ostwald Ripening Model

Ahmad Fadli[1], Amun Amri[1], Esty Octiana Sari[1], Iwantono[2], Arisman Adnan[3],

[1]*Department of Chemical Engineering, Universitas Riau*
[2]*Department of Physics, Universitas Riau*
[3]*Department of Mathematics, Universitas Riau*
Jl. HR Subrantas Km 12.5 Pekanbaru 28293 Riau, Indonesia
Phone/Fax: +62761566937, Email: fadliunri@yahoo.com

Magnetite nanoparticle (Fe_3O_4) is one of magnetic particles with huge potential to be applied as drug delivery carrier due to their excellent superparamagnetic, biocompatible and easily modified surface properties. Characteristics of nanoparticles can be controlled by studying the evolution of crystal growth. The purpose of this research is to study the evolution of magnetite crystal growth and determine crystal growth kinetics using Ostwald Ripening model. Magnetite nanoparticles were synthesized from $FeCl_3$, citrate, urea and polyethylene glycol using hydrothermal method at 220˚C for 1 - 12 hours. Characterization by X-ray Diffraction (XRD) indicates that magnetite begin to formed at 3 hours synthesis. The crystallinity and crystal size of magnetite increased with reaction time. Diameter size of magnetite crystals was in the range of 10-29 nm. Characterization by Transmission Electron Microscope (TEM) shows that magnetite nanoparticles have uniform size and non-agglomerated. The core-shell nanoparticles were obtained at 3 hours synthesis with diameter of 60 nm, whereas the irregular shape nanoparticles were obtained in 12 hours with diameter of 50 nm. Characterization by Vibrating Sample Magnetometer (VSM) shows that magnetite nanoparticle has superparamagnetic properties. The magnetization saturation (Ms) value was proportional to the degree of crystallinity. Magnetite crystal growth data can be fitted by Ostwald ripening growth model with growth controlled by the dissolution of surface reaction ($n \approx 4$).

Keywords:

Crystal growth, Hydrothermal, Magnetite, Nanoparticles, Ostwald ripening

Diuretic Effect of Jamu Antiatherosclerosis by in Vivo Testing on Male Rats

Dewi Tristantini[a*], Clarissa Ancella[b]

[a]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia* [b]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

Hypertension has become the worldwide's focus because mortality rate due hypertension is increasing every year. One of the antihypertensive drug is diuretic which cause a decrease in blood pressure. Active substances provide a diuretic effect is a flavonoid. Flavonoid in combination of bullet wood leaves, curcuma and starfruit leaves empirically proven, research and published in decrease blood sugar levels, decrease cholesterol and improve blood circulation. The combination of bullet wood leaves, curcuma and starfruit leaves become jamu antiatherosclerosis. Jamu antiatherosclerosis extracted using reflux so particle size affects the flavonoid produced. Particle size jamu antiatherosclerosis is smaller than 60 mesh so jamu antiatherosclerosis which has the highest apigenin and catechin is particle size smaller than 60 mesh. The method used is testing *in vivo* to male rats (*Rattus norvegicus*). The study used 6 group of rats are normal control (without treatment), negative control (induced NaCl and standard feed), positive control (captopril 0.72 mg), dose I (13.2 mg herb), dose II (26.4 mg herb) and dose III (52.8 mg herb). Data retrieval urine volume and blood pressure of the rats were taken within 21 days. The data showed that diuretic activity jamu antiatherosclerosis dose I was 0.724, dose II was 0.792 and dose III was 0.843. The results showed that caused an increase in urine volume in which higher diuresis effect is achieved by increasing the amount of extract. This research conclude that jamu antiatherosclerosis can use as an inexpensive diuretic herbs in lowering blood pressure and the results can be used to improve public welfare.

Keywords:

Diuretic; Antihypertensive; Tanjung leaves (Mimusops elengi L.); Starfruit leaves (Averrhoa carambola L.); Curcuma (Curcuma xanthorrhiza L.); Particle size

CHE4 - 2

Partial Phase I Environmental Site Assessment of Piyungan Landfill and Anaerobic Fluidized Bed Reactor (AFBR) Pilot Study for Leachate Treatment

Christina Browning[a,1], Sholahudin Al Ayyubi[b], and Wiratni Budhijanto[b,2]

[a]Environment and Resource Management Department, Arizona State University, United State of America
[b]Chemical Engineering Department, Faculty of Engineering, Universitas Gadjah Mada, Jl. Grafika 2 Yogyakarta 55281 Indonesia [b]Center for Energy Studies, Universitas Gadjah Mada, Sekip K-1A Yogyakarta 55281 Indonesia

An abbreviated Phase I Environmental Site Assessment was performed to identify areas of potential contamination within the leachate management system at Piyungan landfill in Yogyakarta and to evaluate the mitigating effects of an Anaerobic Fluidized Bed Reactor (AFBR) pilot study on the recognized environmental conditions. The AFBR pilot system was found to reduce the quantity and hazardous components of the Piyungan leachate thus reducing the landfill's negative impact on surface waters and air emissions. The AFBR pilot system allows more quantities of high-organic content leachate to reach the methanogenic phase of decomposition in a shorter amount of time than in the naturally occurring process of untreated leachate, preventing the production of organic acids, alcohols, methane and nitrogen which can cause an adverse effect on vegetation, animal species and humans when exposed to unnatural levels of these compounds. The AFBR system is also effective in reducing methane emissions; a significant result due to the high global warming potential of this gas. However, these mitigation efforts are limited in the pilot system's current state. In order to have a more effectively alleviate the recognized environmental conditions (RECs) on site, the AFBR system would require scale up and calibration to reach maximum efficacy with additional treatment systems for hazardous non-organic contaminants.

Keywords:

Phase I Environmental Site Assessment, Leachate Treatment, Anaerobic Treatment of Leachate, Anaerobic Fluidized Bed Reactor, Municipal Solid Waste Landfill Environmental Impact

CHE4 - 3

Synthesis and Characterization of Carbon Material Obtained from Coconut Coir Dust by Hydrothermal and Pyrolisis

Cipta Panghegar Supriadi [1]*, Evvy Kartini[2], Wagiyo Honggowiranto[2], Kris Tri Basuki[1]

[1]Nuclear Chemical Engineering, Polytechnic Institute of Nuclear Technology, National Nuclear Energy Agency, Yogyakarta, Indonesia
[2]Center for Science and Technology for Advanced Materials, National Nuclear Energy Agency, South Tangerang 15314, Indonesia
**cipta255@gmail.com, evvy.kartini@gmail.com, kristri_basuki@batan.go.id*

Since 2004, graphene became an rising star due to its superior properties. However, limited scale producing method made graphene costly. Beside that, the existing method required chemical that would be detrimental to environment. Therefore, Coconut coir dust (CCD) was used as carbon precursor in this research to provide intermediate-product for further graphene production. Firstly, CCD sieved into 100 mesh was carbonized through a hydrothermal method at temperature of 235^{o}C, 250^{o}C, and 265^{o}C for 4 hours. Then, The obtained solid residue was pyrolized at 1000^{o}C for 2 hour under the protection of nitrogen (N_2). Furthermore, The hydrothermal solid residue labeled as CHT_(hydrothermal temperature) and the pyrolisis product named as SP_(hydrothermal temperature) both sample characterized using SEM, XRD and EDS. In addition, Raman characterization was done for SP samples. In the end of process (SP), the XRD pattern showed two broad peak centered around 2θ ~24^{o} and 44^{o} corresponded to (002) and (100) graphite plane. Moreover, this pattern had a similarity to that of reduced-graphene oxide. SEM images showed a sheet-like microstructure which was caused by undegraded lignin. The perforated and corrugated sheet formed after pyrolisis which confirmed the formation of reducedgraphene oxide. Furthermore, The Raman result indicated that higher hydrothermal temperature lead to an increasing integrated I_D/I_G ratio. The ratio were 1.62, 1.71 and 1.77, for SP 235, SP 250, and SP 265, respectively. From the research, it was concluded that the carbonaceous material formed through subsequent hydrothermal and pyrolysis process contained mixture of amorphous-carbon form and graphene-like cluster. In addition, showed similar structure with reduce-graphene oxide.

Keywords:

Graphene, Hydrothermal, Pyrolisis, Carbonization, Reduced Graphene Oxide

Ionic Interaction between Polystyrene Sulfonate and Cetyltrimethylammonium Bromide in Aqueous Solution

Agus Haryono[1] and Sri Budi Harmami[1]

[1]*Polymer Chemistry Group, Research Center for Chemistry, Indonesian Institute of Sciences (LIPI), Kawasan Puspiptek Serpong, 15314, Banten, Indonesia*

Polystyrene sulfonate (PSS) were prepared by sulfonation method of polystyrene using sulfuric acid. The characterization of PSS was carried out by using UV-Vis, Fourier transform infrared spectroscopy (FTIR), nuclear magnetic resonance (NMR) spectra, molecular weight and analysis of sulfonation degree. The degree of sulfonation was obtained at 94,18%. Ionic interaction between anionic polymer PSS and cetyltrimethylammonium bromide (CTAB) as cationic compound in aqueous solution were analyzed by using dynamic light scattering (DLS), conductometry and fluorimetry. Behavior of conductivity have been calculated the critical micelle concentration (cmc). The FTIR and ^{1}H-NMR spectra showed the ionic interaction between PSS and CTAB.

Keywords:

Ionic Interaction, Polystyrene Sulfonate, Sulfonation, Polymer

CHE4 - 5

Properties of Carbon Composite Paper Derived from Coconut Coir as a Function of Polytetrafluoroethylene Content

Fredina Destyorini[1], Indriyati[2], Nanik Indayaningsih[1], Bambang Prihandoko[1] and Anne Zulfia Syahrial[3]

[1]*Research Center for Physics, Indonesian Institute of Sciences (LIPI), South Tangerang, Indonesia*
[2]*Research Unit for Clean Technology, Indonesian Institute of Sciences (LIPI), Bandung, Indonesia*
[3]*Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Depok, Indonesia*

The carbon composite papers were produced by utilizing carbon materials from coconut coir. In the present work, carbon composite papers (CCP) were prepared by mixing carbon materials in the form of powder and fibre with polymer (ethylene vinyl acetate and polyethylene glycol) in xylene at 100°C. Then, polytetrafluoroethylene (PTFE) with different content was used to treat the surface of CCP. The properties of PTFE-coated CCP were analysed by means of contact angle measurement, tensile testing, porosity, density, and electrical conductivity measurements. As expected, all CCP's surfaces treated with PTFE were found to be hydrophobic with contact angle >120° and relatively constant during 60 minutes measurement. Furthermore, water contact angle, density, and mechanical properties of CCP generally increase with increasing PTFE content. However, the porosity and electrical conductivity of CCP decrease slightly as the PTFE content increased from 0 wt% to 30 wt%. Based on the observation and analysis, the optimum PTFE content on CCP was 20 %, in which the mechanical properties and hydrophobicity behaviour were improved significantly, but it was only caused a very small drop in porosity and electrical conductivity.

Keywords:

Carbon Composite Paper; Coconut Coir; Electrical Conductivity; Polytetrafluoroethylene

CHE4 - 6

Membrane-Based Downstream Processing of Microbial Xylitol Production

Ria Desiriani, M.T.A.P Kresnowati*, I.G.Wenten

Chemical Engineering Department, Institut Teknologi Bandung, Jl.Ganesha 10, Bandung 40132, West Java, Indonesia

Xylitol is a sugar alcohol that has been used as sweetener in food industries. Xylitol can be produced from D-xylose by fermentation process. However, xylitol from fermentation process needs to be separated from other components of fermentation broth, such as metabolic products, residual substances, biomass cells and mineral salts before further purified as xylitol crystalls. Therefore, in order to obtain high purity of xylitol, various separation processes are required to separate the desired product from the fermentation broth. One of the most promising downstream processing methods is membrane separation. This study describes the evaluation of membrane based processes for the separation of biomass cells and other impurities as well as the concentration of xylitol from yeast *Debaromyces hansenii* fermentation broth. The proposed configuration of this study was polysulfone ultrafiltration membrane for biomass cell separation followed by polyamide nanofiltration for the removal of low molecular weight compounds (e.g., acetic acids) from sugars. The effects of operating pressure were examined with fermentation broth model solution. The results showed that the higher pressure caused the higher permeate flux, however the rate flow of permeate flux decreased within time due to concentration polarization and fouling in ultrafiltration and nanofiltration membranes. Nevertheless, at all pressure, ultrafiltration achieved 99% rejection of biomass cells. In addition microscope analysis showed that no biomass cells were detected in permeates of ultrafiltration. The resulting nanofiltration concentrates showed a high xylitol retention and beneficially lower concentration of acetic acids. In test conditions with operating pressure of ultrafiltration were 1 bar and 1.5 bar respectively, showed that at pressure 5.5 bar, the experiments achieved a reasonably high xylitol retention of above 90% which indicated negligible losses of the sugar in the permeate port. Moreover, this configuration was proven to be a feasible way to concentrate xylitol up to three times from initial concentration of model fermentation broth. Therefore, the results indicated that two-stage combination of ultrafiltration and nanofiltration are a promising system for downstream processing of microbial xylitol production.

Keywords:

Biomass cells; Fermentation broth; Nanofiltration; Permeate Flux; Ultrafiltration; Xylitol

CHE4 - 7

Determination of Extraction Process Conditions of Gambier Catechin (Uncaria Gambier Roxb) From Solok Bio Bio Limapuluh Kota District – West Sumatera

EllyDesniRahman[1],Ellyta Sari[1],Burmawi[2],MariaUlfah[1],Frizka[1], Endah[1]

[1]DepartmentofChemicalEngineering, UniversitasBungHatta,Padang25158 West Sumatra,Indonesia
[2]Department of Mechanical Engineering, Universitas Bung Hatta,Padang 25158 West Sumatra, Indonesia

Catechin content is the determinant key of quality in gambier trade. The required Catechin content of gambier extracts as a herbal medicinal ingridient is greater than 90%. Mostly, Local gambier that produced by community is not uniform and low quality, thus lowering the price in the export markets. The quality improvement of gambier can be done by extraction and purification processes. This study aims to determine the best extraction process of catechin from Gambier (Uncaria Roxb) which derived from Bio Bio Limapuluh Solok City, West Sumatra.The research methodology includes pre purification: raw materials preparation, washing, filtration, extraction, drying and testing. Washing was done on 100 gr gambier with a variation of water at 500, 600.700 and 800 ml, heating for 1 hour at a temperature of 70C, screened, filtered, and allow to stand until a precipitate is formed, wash repeatedly, filtered, and dried. Further, extract with a solvent variation of : water, etyl acetate, heated at 70C temperature for 1 hour, then filtered. Filtrate then thickened by using a Rotary evaporator, dried at 50C temperature for 48 hours and analyzed. The results showed that the best conditions of the extraction process is by using a solvent etyl acetate, at a temperature of 70C, grading 97.40% catechins.

Keywords:

Catechin; Gambier; Extraction

Improvement of Cement Plant Dust Emission by Bag Filter System

Chandra Wahyu Purnomo[1,2], Wiratni Budhijanto[1,2], Muziibu Alfisyah[3], Triyono[3]

[1]*Chemical Engineering Department, Gadjah Mada University, Jl. Grafika No. 2 Yogyakarta 55281, Indonesia*
[2]*Center for Energy Studies, Gadjah Mada University, Jl. Sekip UGM K-1A Yogyakarta 55281, Indonesia*
[3]*PT Indocement Tunggal Prakarsa, Palimanan, Cirebon, West Java Indonesia*

The limestone quarry of PT Indocement Tunggal Prakarsa (ITP) in Cirebon is considered as a complex quarry in terms of chemical composition and material hardness. From the beginning of the plant operation up to the end of 2015, the dust removal was rely on electrostatic precipitator (EP) system. Whenever limestone from certain quarry zones were mixed into Raw Mill (RM) feed or there was an upset condition, the dust emission from the stacks increased significantly. Beside higher demand of electricity, an EP system requires lower gas inlet temperature in order to remove the dust effectively which requires larger cooling water in the previous gas conditioning tower to cool down gas from 400 ^{o}C to about 100 ^{o}C. By considering the drawbacks, the EP system was replaced by a bag filter (BF) system. The BF allows higher temperature of gas inlet with higher dust removal efficiency. In this study, the efficiency of the two different dust removal systems is compared. The effect of process variables i.e. RM feed, kiln feed, inlet temperature and pressure, and small size particle fraction to the dust emission are studied by a simple multivariate linier regression analysis. It is observed that the BF system can reduce significantly the dust emission from 30 to 6 mg/m^3 and in the same time reducing CO_2 emission by 0.24 ton/year from the electricity consumption saving.

Keywords:

Cement plant; Dust emission; Bag filter; Electrostatic precipitation

CHE5 - 2

Hydrogen Recovery from Hydrogen-Methane Gas Mixture Utilized by Palm Shell based Bioadsorbent Activated Carbon

S N Putri[a], M Sudibandriyo[b*]

[a]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*
[b]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

The objective of the study is to obtain suitable adsorbent to be applied for purification of hydrogen from hydrogen-methane gas mixture. The application will be used to increase the efficiency of process in refinery unit focusing on hydrogen supply as the feed of hydrocracking unit. One of the promising technology is adsorption. In this study, adsorbent used is utilized by palm shell based bioadsorbent activated carbon that is a promising choice among others due to its carbon and lignin content also its abundant supply in nature. The activated carbon is going through chemical activation using H_3PO_4 to increase its surface area. Characteristic test of produced activated carbon is measured to obtain surface area which resulted BET surface area 414.91 m^2/g and iodine number 716 mg/g. In this case, a detailed experimental study has been made of the adsorption of pure methane, and pure hydrogen at 20^{o}C and CH_4/H_2 gas mixture at 10, 20, and 30^{o}C isothermal condition with pressure variation for each isothermal condition 1 – 6 bar. Measurement were made using volumetric technique coupled with gas chromatographic analysis. The result of adsorption test shows at 20^{o}C adsorption of pure CH_4 was highest followed by mixture gas of CH_4/H_2 with 1.5% methane then pure H_2. The adsorption of gas mixture for any composition of gas were increased with increasing pressure at all temperatures. At the same pressure, adsorption of gas mixture that composed of 8.5% methane at 10 and 30^{o}C increased in lower isothermal condition. Based on gas chromatograph analysis, in all conditions methane in gas mixture is all adsorbed to activated carbon. The trend of isothermal adsorption also fits the Langmuir model of isothermal adsorption.

Keywords:

Activated Carbon; Adsorption; Hydrogen Recovery; Methane; Palm Shell

Burn Drug Made from Ozonated Vegetable Oil Mixture with White Tumeric and Cassava Leaves Extract

F Moulydia[a*], N Salsabila , R K Dewi, A Nirmala, S Bismo

[a] *Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*
*farahmoulydia@gmail.com

This research aims to create a burn treatment performed with ozonation process from a mixture of vegetable oil and added extracts of herbal ingredients. Ozonation on vegetable oils proven to kill bacteria and safe for the body. Ozonated vegetable oil produced from the ozone reactor batch process by doing a variety of extraction mixture to Oleozon® and vegetable oils. Then the results of ozonation is added extracts of herbal ingredients that cassava leaves and white turmeric to increase effectiveness in killing bacteria. Cassava leaves have anti-inflammatory agent, namely Vitamin C. While white turmeric Curcuma zedoaria have substance, which of the two compounds can inhibit and kill bacteria. The quality of ozonated oil (Oleozon®) analytically were tested by the method of iodine number, acid number, peroxide number, and FTIR. Ozonation increased the peroxide and acid values for both oils, the increase being higher for mixture of coconut oil and soybean oil. The results of such mixing is then tested in bacteria to determine their effectiveness in killing the bacteria. The best ozonation condition is in an increase of 386,85% acid value, peroxide value about 102,91 meq/kg oil, and decrease in iodine number up to 21%. The result showed that under these conditions, ozonized oil has an antiseptic effect against *Staphylococcus aureus.* The final results of this study are expected to be a new innovation in the healing of skin wounds caused by burns as an anti-inflammatory that is effective, safe, and environmentally friendly.

Keywords:

Anti-Bacterial, White Tumeric, Cassava Leaves, Burns, Ozonated Oil

CHE5 - 4

Studies on Biosorbent Adsorption Capacity of Sargassum sp Combined with Clay for Hexavalent Chromium Removal in Wastewater

Tine Aprianti[1], Selvia Aprilyanti[2], Rachmawati Apriani[3] and Sisnayati[4]

[1]Chemical Engineering Department of Universitas Sriwijaya
[2]Industrial Engineering Department of Universitas Tridinanti
[3]Pulp and Paper Technology Department of Institut Teknologi dan Sains Bandung [4]Chemical Engineering Department of Universitas Tamansiswa

Various raw biosorbents have been studied for pollutant treatment of heavy metals contained in wastewater. In this study, clay and brown seaweed *Sargassum sp,* were used for hexavalent chromium [Cr (VI)] biosorption. The adsorption capacity is adequately improved by combining clay and *Sargassum sp* as the adsorbent agents. Ion exchange of metal ions has shown strong coordination cross-linkage due to organic functional hydroxyl groups (OH^-) contained in brown seaweed that provide sites to capture and bind the metal ions. Clay is known as an inexpensive adsorbent due to its wide availability besides its large specific surface area. Combining clay and *Sargassum sp* as biosorbent resulting in a better adsorption, the adsorption capacity reaches most favorable results of 99.39% at *Sargassum*:clay ratio of 40:60 on contact time 10 h. This study has proven that biosorbent used has succeeded to reduce hexavalent chromium pollutant in wastewater.

Keywords:

Adsorbent; Biosorption; Clay; Hexavalent Chromium; Sargassum sp.

CHE5 - 5

Performance Study of Fludized Bed Dryer with Immersed Heater for Paddy Drying

Suherman Suherman, Nadia Fridasaniya Azaria, Shelma Karami

Departement of Chemical Engineering, Faculty of Engineering, Diponegoro University Jl. Prof. Soedarto SH, Kampus Undip Tembalang, Semarang, Indonesia 50275, Telp: +62247460058, Fax : +622476480675, Email: suherman.mz@che.undip.ac.id

This paper investigated the performance of fluidized bed dryer with immersed heater for paddy drying. The influence of drying temperature and the temperature of immersed heater on drying curve, thermal efficiency, and quality of paddy was investigated. The fixed operating conditions are drying time of 60 minutes, paddy weight of 200 grams and the air velocity of 0.4 m/s. The variables are drying temperature and the temperature immersed heater namely 50, 60, 70, 80, 90 (˚C). The results show addition immersed heater will increase drying rates. No constant drying rate was found. Increasing the temperature will decrease the utilized energy. The thermal efficiency decreases with increasing temperature. The increasing temperature and use immersed heater will decrease the residual moisture content, increase damaged and yellow paddy grain, and increase red paddy grain.

Keywords:

Drying, Paddy, Fluidized Bed Dryer, Immersed Heater, Performance

CHE5 - 6

Wet Impregnation of Silver Oxide on Lampung Natural Zeolite as an Adsorbent to Produce Oxygen-Enriched Air Using PSA Technique

A G Dianty*, A R S Harahap, C Harfian, S Bismo

Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia
*adeniagita@gmail.com

Investigation of an adsorbent to produce oxygen-enrich air was carried out by using silver oxide (AgO) and zeolite, especially natural zeolite. Oxygen-enrich air needed to be produce as it can be used for various things, such as medical purposes, ozone production, and mainly for a few chemical plant productions. Oxygen purification method to be applied on this research is the Pressure Swing Adsorption (PSA) technique. The adsorbent that would be used is a natural zeolite, especially natural zeolite namely ZAL (Natural Zeolite from Lampung, Indonesia). Natural zeolite has non-polar properties, so it will adsorb gas with high quadrupole moment, which is nitrogen. Before ZAL was used as an adsorbent, ZAL was prepared by using demineralized water, then sulfuric acid (H_2SO_4) and sodium hydroxide (NaOH). The purpose of this pre-treatment was to remove the impurities and to increase the specific surface area of zeolite. Moreover, ZAL will also be modified by wet impregnation technique using $AgNO_3$ solution, in which the AgO will be impregnated to the surface and pore of ZAL, and will be calcinated to decompose the nitrogen dioxide (NO_2) with temperature of 350^{o}C for 1.5 hours. The modification of ZAL with wet impregnation technique will enhance the adsorption capacity of zeolite. Size of ZAL, loading percentage of AgO and the concentration of sulfuric acid (H_2SO_4) were varied to get the optimum value. The morphology, composition, and crystal phase were characterized by BET, scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDX). The result of the adsorption process was analyzed by using GC (Gas Chromatograph). ZAL with the smallest size and lowest sulfuric acid concentration (H_2SO_4) has the best activity of adsorbing nitrogen. The expected result of this research is a new innovation of preparing adsorbent that can be used to adsorb nitrogen from air using PSA technique, and to determine the best activation condition for ZAL.

Keywords:

Zeolite; Wet impregnation; Silver oxide; Adsorption; Pressure swing adsorption

CHE6A - 1

Catalytic Pyrolysis of Waste Plastic Mixture

Ferdianta Sembiring[1], Chandra Wahyu Purnomo[1,3]*, Suryo Purwono[2]

[1]Advanced Materials and Mineral Processing Research Group,
[2]Energy and Environment Research Group, Chemical Engineering Dept. Universitas Gadjah Mada,
Jalan Grafika no 2, 55281 Yogyakarta Indonesia.
[3]Renewable Energy and Waste Utilization Division PIAT UGM, Berbah Sleman Yogyakarta Indonesia

Inorganic waste especially plastics still become a major problem in many places. Low biodegradability of this materials causes the effort in recycling become very difficult. Most of the municipal solid waste (MSW) recycling facilities in developing country only use composting method to recover the organic fraction of the waste, while the inorganic fraction is still untreated. By pyrolysis, plastic waste can be treated to produce liquid fuels, flammable gas and chars. Reduction in volume and utilization of the liquid and gas as fuel are the major benefits of the process. By heat integration actually this process can become a self-sufficient system in terms of energy demand. However, the drawback of this process is usually due to the diverse type of plastic in the MSW creating low grade of liquid fuel and harmful gases. In this study, the mixture of plastics i.e. polypropylene (PP) and polyethylene terephthalate (PET) is treated using pyrolysis with catalyst in several operating temperature. PET is problematic to be treated using pyrolysis due to wax-like byproduct in liquid which may cause pipe clogging. The catalyst is the mixture of natural zeolite and bentonite which is able to handle PP and PET mixture feed to produce high grade liquid fuels in terms of calorific value and other fuel properties.

Keywords:

Catalytic Pyrolysis; Natural Zeolite; Waste Plastics

CHE6A - 2

Studies Of Carbonization Process On The Production Of Durian Peel Biobriquettes With Mixed Biomass Coconut And Palm Shells

Ellyta Sari[1], Pasymi[1], Umar Khatab[2], Reni Desmiarti[1], Rian Ariansyah[1], Hariadi[1], Sutra[1]

[1]Departement of Chemical Engineering, Universitas Bung Hatta,
Padang West Sumatra,25158, Indonesia
[2] Department of Civil Engineering, College of Technology Payakumbuh,
West Sumatra, Indonesia

Biobriquettes as alternative energy that can replace the role of kerosene. Biobriquettes made from agricultural waste biomass. Biobriquettes durian peel has been researched and developed continuously to obtain optimal quality in terms of calorific value, compressive strength and duration of ignition. In making durian peel biobriquettes needed other biomass mix to sustain duration of Ignition for biobriquettes durian skin quickly burned out. Stages of making biobriquettes durian skin are: material of drying, carbonization of biomass, grinding, mixing with adhesives, and printing. Carbonization process is a process that is important in obtaining the biomass charcoal. Carbonization is done by means of karbonisator pyrolysis. The purpose of this research is to study the process of carbonization to obtain biobriquettes durian skin that of quality in terms of value compressive strength, calorific value, and duration of ignition. Variations that done was kind mix of biomass,coconut shells and palm shells with the massa ratio 2 : 1, type of adhesive used tapioca powder and banana peels, carbonization of temperature 200^{o}C, 300^{o}C and 400 ^{o}C . The results showed that the highest compressive strength of the durian skin with a mixture of coconut shell and adhesive tapioca powder and carbonization temperature of 300 ^{o}C namely 12,7 g/cm^2. The calorific value of the highest on the mix of skin durian with coconut shells and adhesive banana skin with temperature of carbonization 400 ^{o}C ie 6040 cal/g, and duration of ignition highest on a mixture of skin durian with coconut shell and adhesive banana skin at a temperature of carbonization 300 ^{o}C is 73 minutes.

Keywords:

Biobriquettes, Durian peel , Carbonization

CHE6A - 3

Green Diesel Production from Palm Oil using Klaten's Natural Zeolite Modified with Fe Metal Nanoparticle as Heterogeneous Catalyst

Witri Wahyu Lestari[a,3], Riandy Putra[a], Bambang Heru Susanto[b], Fajar Rakhman Wibowo[a]

[a]*Department of Chemistry, Faculty of Mathematics and Natural Sciences, Sebelas Maret University, Jl. Ir Sutami No.36A, Kentingan-Jebres, Surakarta Central Java 57126, Indonesia, Fax: +62 271 663375; Tel: +62 271 663375, witri@mipa.uns.ac.id*

[b]*Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru Universitas Indonesia, Depok 16424, Indonesia*

Petroleum-based fossil fuel is still the primary source of energy consumption in Indonesia. Considering that almost all of automotive for the transportation sector utilize of this un-renewable fuel cause the depletion of fossil-fuel. An alternative renewable fuel for solving this problem is the production of bio-hydrocarbon from biomass, so-called green diesel. Chemically, green diesel has the similar structure to petroleum-diesel properties that can be produced through the hydrodeoxygenation of vegetable oil. In the present work, green diesel produced from palm oil was performed in a semi-batch stirred autoclave reactor over natural zeolite-supported Fe nanoparticle as a heterogeneous catalyst. In this research, natural zeolite from Klaten's, Central Java was activated using hydrochloric acid 6 N and continued by cation exchange using NH_4Cl 1 N. These treatments successfully increased Si/Al ratio from 4.72 to 7.82 according to XRF analysis. This result indicated that some dealumination process which is lead to the pure mordenite phase occurred. The dealuminated natural zeolite was characterized by XRD analysis supported with refinement process, TO_4 site (T = Si or Al) by FTIR and morphological analysis by SEM-EDX. The result showed that the structure of dealuminated natural zeolite remains stable, cleaner and promising for catalytic properties. Compared with the simulated powder pattern, the dealumination of natural zeolite lead to a purer mordenite phase. Based on FTIR data, OH stretching band from silanol groups was observed at 3440-3650 cm^{-1} and an asymmetric stretching band of the tetrahedral atoms is shifting to the higher wavenumber from 1047.39 cm^{-1} to 1065.72 cm^{-1} due to the dealumination process. Morphological analysis using SEM showed that activated zeolite still occupy irregular shape but much cleaner. Modification of Klaten natural zeolite with Fe (1, 3, 5, 10 wt.%) was prepared by the incipient wetness impregnation method by using $Fe(NO_3)_3.9H_2O$ as a precursor. The presence of Fe metal nanoparticles on the surface and pore of activated and natural zeolite have no significant influence on the crystall structure, according to XRD analysis. The occupancy of Brønsted acid site of the sample was observed by FTIR analysis. The obtained materials were tested for the conversion of palm oil into diesel-range hydrocarbons (C_{12}-C_{18}) under conditions of 375 °C, 12 bar H_2, 550 rpm for 2 h. By combining gas-phase and liquid product analyses, decarboxylation and/or decarbonylation was a dominant reaction pathway when the Fe supported on activated natural zeolite (Fe/ANZ) catalyst was employed. The most abundant composition in the liquid hydrocarbon products was straight chain n-C_{15} and n-C_{17} alkanes as observed by GC-MS analysis. The liquid yield product exhibited a higher conversion into diesel-like hydrocarbons reached more than 45% when the Fe/ANZ (10 wt.%) catalyst was used. This study has shown that a series of Fe/ANZ catalyst remains to be highly active and favorable for contributing in the conversion of palm oil into green diesel at a high temperature.

Keywords:

Klaten's Natural Zeolite; Modification; Iron Nanoparticles; Hydrodeoxygenation; Palm Oil; Green Diesel

CHE6A - 4

Evaluation of Tray Bioreactor to Upscale Xylanase Production using Solid State Fermentation of Oil Palm Empty Fruit Bunches (Opefb) by Aspergillus Fumigatus

Briantono Djakaria, Tjandra Setiadi*, M.T.A.P. Kresnowati

Microbiology and Bioprocess Technology Laboratory,

Chemical Engineering Department, Institut Teknologi Bandung

The potential of xylanase production by *Aspergillus fumigatus* using solid state fermentation of oil palm empty fruit bunches (OPEFB) as a low-cost lignocellulosic material has been convincing. Not only have xylanases been prevalently used in pulp and paper industry, but also in food and agricultural industries. In order to upscale the production of xylanase, multiple tray bioreactors (8 cm x 5 cm x 4 cm) have been arranged in an incubator (65 cm x 50 cm x 50 cm), maintained at 32^{o}C and high relative humidity. OPEFB were then mixed aseptically with Prado's media along with *A.fumigatus* spores in tray bioreactors. Since keeping a high level of water activity is one of the main challenges in larger scale enzyme production using tray bioreactors, two factors were explicitly evaluated in this study: solid loading to media ratio as well as different particle sizes of OPEFB. The significance of these factors was assessed so that optimum xylanase activity could be achieved while scaling up enzyme production using tray bioreactor. An optimum xylanase activity of 6.59 U/g OPEFB was obtained at substrate length of 1 – 2 cm and solid loading ratio of 25%.

Keywords:

Empty Fruit Bunches; Tray Bioreactor; Solid Loading Ratio; Solid State Fermentation; Xylanase; Xylose

CHE6A - 5

Utilization of Lampung Natural Zeolite as Immobilization Media on Biogas Production from Palm Oil Mill Effluent (POME)

Sri Ismiyati Damayanti[a,b], Simparmin Br.Ginting[a], Amelia Virgiyani Sofyan[a], Alip Tania Putri[a], Wiratni Budhijanto[b,c*]

[a]*Chemical Engineering,Engineering Faculty,University of Lampung,Soemantri Brojonegoro Street, Bandar Lampung 35141, Indonesia*
[b]*Chemical Enginering Department, Engineering Faculty, University of Gadjah Mada, Grafika Street, Yogyakarta 55281, Indonesia*
[c]*Center for Energy Studies, Gadjah Mada University, Yogyakarta 55281 Indonesia*
** wiratni@ugm.ac.id*

Lampung is one of provinces that have a great palm plantations and industries in Indonesia. Each palm plantation produces 0.7-1 m^3 of POME per ton of fresh palm bunches and pollutes the environment when untreated. Furthermore, Lampung is also a region that has an easily obtained and abundant Natural Zeolites (ZAL). Because of this situation, this research was performed to study the influences of modified ZAL as the microorganisms immobilization media (Biocarrier) in biogas production of POME. Hereafter, ZAL as Biocarrier will be applied on Anaerobic Fluidized Bed Reactor (AFBR). AFBR with biocarrier will have higher efficiency than conventional biogas reactor. Furthermore AFBR that allows in vertical design, will economize needed land. Modified ZAL was conducted to provide appropriate place for microorganisms, especially methanogen. This research was started by modification of ZAL (CV. Minatama, Lampung) to physical activated ZAL, impregnated ZAL by Fe^{2+} and impregnated ZAL by Mg^{2+}. Each of modified ZAL was analyzed by XRF, then characterized by XRD and FTIR before used. Based on XRF analysis, SiO_2/Al_2O_3 mol ratio of physical activated ZAL was 8.913, while ZAL-$Fe^{2+,}$ and ZAL-Mg^{2+} were 9.957 and 8.8, respectively. This process took place in a 2.8 L batch anaerobic digester by adding POME and an active digester effluent of cattle manure (Kediri village, Pringsewu, Lampung) as microbial seed booster with ratio of 3:1 in 2.1 L total work volume, then 280 grams of different modified ZALs to each digester. Then the entire conditions of digester were observed through pH, sCOD used HACH *Colorimeter* DR900, VFA used distillation and titration method, biogas volume using Gasometer, and Methane concentration used *Shimadzu Gas Chromatography*. Results showed that sCOD substrate of digestion using impregnated ZAL by trace element decreased more rapidly than physical activated ZAL, so processing time was twice as rapidly until final value of sCOD, which was 21 days. However resulted biogas or methane volume was lower until a half time, that were ranging from 2,500 mL and 1,000 mL. It was obtained because more sCOD absorbed rapidly to cleaner ZAL's suface and pores. This condition caused converted sCOD to biogas lower than absorbed sCOD. Although biogas amount was small, each digester of ZAL-Fe^{2+} and ZAL-Mg^{2+} resulted higher methane concentration than digester using physical activated ZAL in 10 days that were 35%, 45%, and 20% respectively. Resulted high methane concentration in initial processing time showed that Fe^{2+} and Mg^{2+} were nutrition that stimulated methanogen bacteria to be more productive.

Keywords:

Biogas; Immobilization Media; ZAL; AFBR; Methane Concentration

CHE6A - 6

Aqueous Stability Studies of Polyethylene Glycol and Oleic Acid based Anionic Surfactants for Application in Enhanced Oil Recovery through Dynamic Light Scattering Technique

Yan Irawan[a]*, Ika Juliana[a], Yani Faozani Alli[b], Indri Badria Adilina[a]

[a]*Research Center for Chemistry-LIPI, Kawasan PUSPIPTEK Serpong, South Tangerang 15314, Indonesia*
[b]*Research and Development Center for Oil and Gas Technology-LEMIGAS, Jl. Ciledug Raya Kav. 109*
Cipulir-Kebayoran Lama P.O. Box 1089, South Jakarta 12230, Indonesia

The present study investigates the aqueous stability of polyethylene glycol and oleic acid based anionic surfactants through dynamic light scattering (DLS) method and zeta potential for application in enhanced oil recovery (EOR). The polyethylene glycol dioleate sulfonate (PDOS) surfactant solutions was prepared in concentrations of 0,05; 0,1; 0,3; 0,5 and 1wt% in deionized water. Aqueous stability of PDOS were assessed by measuring the droplet size for five days using a Nano Particle Analyzer SZ-100 at 25ºC. Results show that good aqueous stability of PDOS were seen at concentrations of 0.1 to 1wt%, meanwhile the droplet size became unstable at the lowest concentration of 0.05wt%. The polydispersity index were classified into polydisperse distribution type recorded as 0.3 to 0.5 at concentrations of 0.05 and 0.1wt% and 0.2 of 0.3 to 1wt%. The critical micelle concentration (CMC) of PDOS was 0.3% and interfacial tension of PDOS surfactant above the CMC were around 10^{-3} dyne/cm. The zeta potential of PDOS surfactant without the addition of salt in concentrations of 0.05; 0.1; 0.3; 0.5 and 1wt% were highly stable up to -96.8; -90.5; -89.6; -82.3; and -64.4mV, respectively. Whereas with the addition of salt was moderately stable at concentration of 1wt%. The conductivity increased with increasing concentration. Whereas the zeta potential of PDOS with addition of salt were moderately stable in concentration of 1%. Although PDOS with concentration of 0.05% showed a high value of zeta potential with the addition of salt, there is no guarantee that the PDOS surfactant solution will be stable for five days.

Keywords:

Anionic surfactant; Polyethylene glycol; Oleic acid; Aqueous stability; Dynamic light scattering; Zeta potential; Enhanced oil recovery

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The 3rd Biannual Meeting on Bioprocess Engineering

BIO

BIO1 - 1

Techno-Economic Analysis of Lipase Enzyme Production from Agro-Industry Waste with Solid State Fermentation Method

Ibnu Maulana Hidayatullah[1], Tania Surya Utami[1], Maharani Suci[1], Muhamad Sahlan[1], Anondho Wijanarko[1], Misri Gozan[1], Heri Hermansyah[1]

[1]*Department of Chemical Engineering, Faculty of Engineering, University of Indonesia, Depok, West Java 16424, Indonesia*

Needs for this kind of catalyst derived from biological raw materials (biocatalysts) has increased along with development of products based on eco-friendly. To achieve the needs of biocatalyst (enzyme), large production is necessary. This study aimed to get the best conditions and design equipment to produce lipase enzyme based on solid state fermentation using SuperPro Designer v9.0. Several equipment such as *Tray Bioreactor*, *Mixing Tank* 1, *Filter Press*, centrifuge, *Mixing Tank* 2, and a dryer have been improved during the simulation. Economic analysis in the form of NPV, IRR, Payback Period, and the Benefit Cost Ratio was evaluated respectively. The result showed that production of 10 kg enzyme with NPV Rp112.796.147.423,00; IRR 54.20%; Payback Period 1.95 years; and Benefit Cost Ratio of 3.36 was more advantageous.

Keywords:

Lipase Production; Simulation; Techno-Economic Analysis; Solid State Fermentation; Agro-Industry Waste

BIO1 - 2

Pressure of Compressor and Steam Reformer Temperature Control in Biohydrogen from Biomass Plant using Model Predictive Control based on System Re-Identification

Abdul Wahid* and Hafizh Malik H. Taqwallah

Energy Sustainability Research Group, Dept. of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok 16424, Indonesia
** wahid@che.ui.ac.id*

Compressors and a steam reformer are the important units in biohydrogen from biomass plant. The compressors are useful for achieving high-pressure operating conditions while the steam reformer is the main process to produce H_2 gas. To control them, in this research used a model predictive control (MPC) expected to have better controller performance than conventional controllers. Because of the explicit model empowerment in MPC, obtaining a better model is the main objective before employing MPC. The common way to get the empirical model is through the identification system, so that obtained a first-order plus dead-time (FOPDT) model. This study has already improved that way since used the system re-identification (SRI) based on closed loop mode. Based on this method the results of the compressor pressure control and temperature control of steam reformer were that MPC based on system re-identification (MPC-SRI) has better performance than MPC without system re-identification (MPCWSRI) and the proportional-integral (PI) controller, by % improvement of 73% against MPCWSRI and 75% against the PI controller.

Keywords:

Bio-hydrogen, biomass, predictive, control, system re-identification

BIO2 - 1

Influence of Nutrient Impregnated into Zeolite Addition on Anaerobic Digestion of Pome with Digested Biodiesel as Starter

Melly Mellyanawaty[a], Firda Mahira Alfiata Chusna[b], Novi Nurjanah[a],

Wiratni Budhijanto[b*]

[a]Department of Environmental Engineering Faculty of Engineering
Universitas Muhammadiyah Tasikmalaya, Tasikmalaya Indonesia
[b]Department of Chemical Engineering Faculty of Engineering
Universitas Gadjah Mada, Yogyakarta Indonesia

Palm oil mill effluent (POME) is wastewater generated from palm oil milling activities which is brownish liquid, acidic with pH 3-4; contain soluble materials that are injurious to the environment. It has high organic content (COD 40,000–60,000 mg/L). According to its characteristics, POME was identified as a potential source to generate renewable energy through anaerobic digestion. In other words, a combination of wastewater treatment and renewable energy production would be an added advantage to the palm oil industries. Methanogenesis is the rate limiting step in anaerobic digestion. In the conventional anaerobic digesters require large reactors and long retention time. The addition of microbial immobilization media conducted to improve anaerobic treatment to obtain higher organic removal and methane production. In addition, to reduce reactor volume and shorter retention time in high rate anaerobic digester. The loading of essential microorganism nutrient into the media may increase the affinity of bacteria to attach and grow on the media surface.
Activator or inhibitory effects of natural and modified zeolite addition on anaerobic digestion of POME was studied in batch reactors using erlenmeyer of 1000 mL at COD concentrations of 8000 mg/L. Zeolite was loaded with nickel and magnesium at concentrations of 0.0561 mg Ni/g zeolite and 0.0108 mg Mg/g zeolite. The effect of the different zeolite were determined by the measurement of soluble COD, Volatile Fatty Acids (VFAs) and biogas production. A greater effect of modified zeolite wtih nickel was observed with an increase the biogas production of 54%. Meanwhile, the modified zeolite with magnesium loaded less stimulated methanogenic bacteria activities. Modified zeolite with nickel addition to digesters can allow an improve in the potential biodegradability of POME and/or a considerable reduction the volume digesters.

Keywords:

Anaerobic Digestion; POME; Zeolite; Nutrient; Immobilization Medium

Batch Studies of Cadmium (II) Biosorption by Dried *Aphanothece Sp* Biomass from Carbon Dioxide Fed Photobioreactor System

Awalina [a,b], Eka Oktariani [a] , Ardiyan Harimawan [a], and Tjandra Setiadi [a]

[a]*Department of Chemical Engineering-The Faculty of Industrial Technology, Institut Teknologi Bandung, Jln. Ganesha No.10, Bandung 40132*

[b]*Research Center for Limnology-The Indonesian Institute of Sciences, LIPI Cibinong Science Center, Cibinong-Bogor 16911*

Dried biomass of *Aphanothece sp* (Cyanobacter) was produced from a photobioreactor system fed with 15% (v/v) carbon dioxide gas and employed as a biosorbent in batch biosorption test of cadmium (Cd) (II) ions from aqueous phase. It was conducted as function of pH, biomass concentration, and solution temperature as well as contact time. The optimum operational condition was achieved at pH, biomass concentration, temperature and contact time of 8±0.1, 0.1 g/L, 30ºC and 60 minutes respectively. The equilibrium isotherm data was most fitted well with Langmuir model and Dubinin-Radushkevich (D-R) isotherm models. Hence, it means the biosorption process proceed in monolayer with maximum uptake capacity of 60.24 mg/g (at initial Cd concentration range of 0.29 to 7.13 mg/L or low concentration range) and 526.23 mg/g (at initial Cd concentration range of 5.41 to 83.07 mg/L or high concentration range). The mean of the free energy derived from D-R isotherm model, resulted 12.91 kJ/mol both at those two range of initial Cd concentrations suggested that chemisorption was occurred. The calculated thermodynamic parameter (ΔG= -8.39 to – 10.88 kJ/mol, ΔH= - 49.78 kJ/mol and ΔS= - 0.13 kJ/mol) indicated that biosorption process was feasible, spontaneous and exothermic under observed condition. Experimental data followed better to pseudo second order kinetics with k_2=1.06E-01 to 1.68E-01 g/mg.minute at low concentration range and 1.52E-03 to 5.2E-03 g/mg.minute). Further, the repetitive reusability of dried *Aphanothece sp* biosorbent can be done for three cycles with HCl 1 M as eluent. In comparison with biosorbent produced from atmospheric carbon dioxide fed photobioreactor, the biosorbent used in this study gave five higher in magnitude of maximum biosorption capacity. It indicated a prospective usage of this biosorbent not only as cadmium biosorbent but also a carbon dioxide bio fixer.

Keywords:

Biosorption, Aphanothece sp, Cadmium, Isotherm equilibrium, Kinetics, Thermodynamics

BIO2 - 3

Producing Armyworm (*Spodoptera sp*.) Bioinsecticide based on Cysteine Protease of Red Ginger (Zingiber Officinale Var. Rubrum)

Tania Surya Utami[1], Nadia Tuada Afnan[1], Danti Firda Nur[1], Muhamad Sahlan[1], Anondho Wijanarko[1], Heri Hermansyah[2*]

[1]*Bioprocess Engineering, Engineering Faculty, University of Indonesia, Depok 16424, Indonesia*
[2]*DRPM Universitas Indonesia, University of Indonesia, Depok 16424, Indonesia*
**heri@eng.ui.ac.id*

Armyworm (*Spodoptera sp.*) is highly polyphagous defoliator on various horticulture and grain plants. Various chemical insecticides have been created to control armyworms. One of those insecticides inhibits Acetylcholinesterase (AChE) in nervous system. Nevertheless, it causes side effect to mammals since their serine catalytic residu in their nervous system are inhibited and accumulated in under-water living organism. There is a need to create an eco-friendly, user-friendly, and specific insecticide which only affect armyworm's nervous system, and degraded safely in the body of under water-living organism. This research investigates cysteine-protease's enzyme activity of red ginger (*Zingiber officinale var. Rubrum*) to block armyworm's AChE. Red ginger is known for its powerful proteolytic enzyme content, called zingibain. Its catalytic site also matches with residue site in armyworm's body so that red ginger's proteolytic enzyme can be used as bioinsecticide raw material which meets the criterias above. Fresh red ginger rhizomes were washed and extracted. The juice was then deposited in low temperature and centrifuged at 4600 rpm to get rid of its starch content. It was filtrated through filtration paper to remove large contaminants. The filtrate was poured into 0.1 M Potassium Phospate buffer pH 7 with ratio 1:1. The liquid was then centrifuged again at 4600 rpm for 30 minutes before collecting the supernatant. Fresh leaves were then dipped into crude ginger protease extract and fed to fourth instar-armyworms. Leaves dipped into non-diluted extract were barely eaten by armyworm while the 50% and 25% dilution was half eaten and most eaten. The crude red ginger extract was not strong enough to kill them although the research showed its enzymatic activity reaches up to 169 PU. It still needs improvement to be produced as commercial bioinsecticide.

Keywords:

Acetylcholinesterase (AChE) Inhibitor; Armyworm (Spodoptera sp.); Bioinsecticide; Cysteine Protease; Red Ginger (Zingiber officinale var. Rubrum)

BIO2 - 4

Anaerobic Digestion of Citrus Waste using Two-Stage Membrane Bioreactor

Ria Millati[1]*, Lukitawesa[2], Ervina Dwi Permanasari[1], Kartika Wulan Sari[1], Muhammad Nur Cahyanto[1], Claes Niklasson[3], Mohammad J. Taherzadeh[2]

[1]*Department of Food and Agricultural Product Technology, Faculty of Agricultural Technology, Universitas Gadjah Mada, Jl. Flora Bulaksumur, Yogyakarta 55281, Indonesia*
[2]*Swedish Centre for Resource Recovery, University of Borås, Allégatan 1, 50190 Borås, Sweden*
[3]*Department Chemical and Biological Engineering, Chalmers University of Technology, 41296 Gothenburg, Sweden*

Anaerobic digestion is a promising method to treat citrus waste. However, the presence of limonene in citrus waste inhibits anaerobic digestion process. Limonene is an antimicrobial compound and could inhibit methane forming bacteria that takes a longer time to recover than the injured acid forming bacteria. Hence, volatile fatty acids will be accumulated and methane production will be decreased. One way to solve this problem is by conducting anaerobic digestion process into two stages. The first step is aimed for hydrolysis, acidogenesis, and acetogenesis reactions and the second stage is aimed for methanogenesis reaction. The separation of the system would further allow each stage in their optimum conditions making the process more stable. In this research, anaerobic digestion was carried out in batch operations using 120 ml-glass bottle bioreactors in 2 stages. The first stage was performed in free-cells bioreactor, whereas the second stage was performed in both bioreactor of free cells and membrane bioreactor. In the first stage, the reactor was set into 'anaerobic' and 'semi-aerobic' conditions to examine the effect of oxygen on facultative anaerobic bacteria in acid production. In the second stage, the protection of membrane towards the cells against limonene was tested. For the first stage, the basal medium was prepared with 1.5 g VS of inoculum and 4.5 g VS of citrus waste. The digestion process was carried out at 55°C for four days. For the second stage, the membrane bioreactor was prepared with 3 g of cells that were encased and sealed in a 3×6 cm^2 polyvinylidene fluoride membrane. The medium contained 40 ml basal medium and 10 ml liquid from the first stage. The bioreactors were incubated at 55°C for 2 days under anaerobic condition. The results from the first stage showed that the maximum total sugar under 'anaerobic' and 'semi-aerobic' conditions was 294.3 g/l and 244.7 g/l, respectively. The corresponding values for total volatile fatty acids were 3.8 g/l and 2.9 g/l, respectively. Methane production of citrus waste taken from the first stage under 'anaerobic' condition in membrane and free-cells bioreactors was 11.2 Nml and 7.2 Nml, respectively. Whereas, methane production of citrus waste taken from the first stage under 'semiaerobic' condition in membrane and free-cells bioreactors was 8.8 Nml and 5.7 Nml, respectively. It can be seen from the results of the first stage that volatile fatty acids from 'anaerobic' condition was higher than that of 'semi-aerobic' condition. The absence of oxygen provides the optimal condition for growth and metabolism of facultative and obligatorily anaerobic bacteria in the first stage. Furthermore, polyvinylidene fluoride membrane was able to protect the cells from antimicrobial compounds.

Keywords:

Two-Stage Anaerobic Digestion; Citrus Waste; Limonene; Membrane Bioreactor; Methane; Volatile Fatty Acid

BIO2 - 5

Characterization of Modified Zeolite as Microbial Immobilization Media on Pome Anaerobic Digestion

Rochim B Cahyono[1,*], Sri Ismiyati[2], Simparmin Br Ginting[2], Wiratni Budhijanto[1]

[1]*Department of Chemical Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia*
[2]*Department of Chemical Engineering, Lampung University, Bandar Lampung, Indonesia.*
** rochimbakti@ugm.ac.id*

As the world's biggest palm oil producer, Indonesia generates also huge amount of Palm Oil Mill Effluent (POME) wastewater and causes serious problem in environment. In conventional method, POME was converted into biogas using lagoon system which required extensive land area. Anaerobic Fluidized Bed Reactor (AFBR) proposes more effective biogas producing with smaller land area. In the proposed system, a immobilization media would be main factor for enhancing productivity. This research studied on characterization of Lampung natural zeolite as immobilization media in the AFBR system for POME treatment. Various activation method such as physical and chemical were attempted to create more suitable material which has larger surface area, pore size distribution as well as excellent surface structures. The physical method was applied by heating up the material till 400^{o}C while HCl was used on the chemical activation. Based on the result, the chemical activation increased the surface area significantly into 71 m^2/g compared to physical as well as original zeolite. The strong acid material was quite effective to enforce the impurities within zeolite pore structure compared to heating up the material. According to distribution data, the Lampung zeolite owned the pore size with the range of 3 – 5 μm which was mesopore material. The pore size was appropriate for immobilization media as it was smaller than size of biogas microbial. The XRD patterns verified that chemical activation could maintain the zeolite structure as the original. Obviously, the SEM photograph showed apparent structure and pore size on the modified zeolite using chemical method. The testing of modified zeolite on the batch system was done to evaluate the characterization process. The modified zeolite using chemical process resulted fast reduction of COD and stabilized the volatile fatty acid as the intermediate product of anaerobic digestion, especially in the beginning of the process. Therefore, the chemical activation process was most suitable to produce the immobilization media from Lampung natural zeolite for POME waste treatment.

Keywords:

Anaerobic digestion; Modified natural zeolite; Palm Oil Mill Effluent (POME); Anaerobic Fluidized Bed Reactor (AFBR); immobilization media

BIO2 - 6

Kinetics of Anaerobic Digestion of Palm Oil Mill Effluent (Pome) in Double Stage Batch Reactor with Recirculation and Fluidization of Microbial Immobilization Media

Laily Isna Ramadhani[1], Sri Ismiyati Damayanti[1], Hanifrahmawan Sudibyo[1,2], Wiratni Budhijanto[1,2,*]

[1] Department of Chemical EngineeringUniversitas Gadjah Mada, Yogyakarta 55281 Indonesia
[2]Center for Energy Studies, Universitas Gadjah Mada, Yogyakarta,55281,Indonesia
[*]wiratni@ugm.ac.id

Palm Oil Mill Effluent (POME) had been big problem for palm oil industries, especially for Crude Palm Oil (CPO) industry since it produced 3 tons of POME for every ton of CPO production. The high amount of organic loading in POME made it potential as a substrate in anaerobic digestion to generate biogas as renewable energy source. The most common but conventional method using open lagoon was still the preferred choice for most CPO industry in Indonesia to treat POME because of its simplicity and easiness. However, this way created new major problem for the water bodies since it had no significant chemical oxygen demand (COD) removal and needed wide area. Besides, greenhouse gas (CH_4) was also released. An innovation was to be made in this study by designing vertical column process equipment to run an anaerobic digestion of POME. The vertical column was functioned as anaerobic fluidized bed reactor (AFBR). To enhance the digestion rate in AFBR, natural zeolite was used as the immobilization media and the inoculum was taken from digested biodiesel waste. This research aims to determine the kinetic constants of double stage anerobic POME digestion for COD removal and for biogas production. To get close to the real condition, the POME used in this experiment had 8,000 mg/L of sCOD (real sCOD was ±16,000 mg/L). The experiment was conducted under room temperature with up-flow velocity was between 1.75 and 2.3 cm/s for optimum fluidization of immobilization media.

Keywords:

Anaerobic Fluidized Bed Reactor; Immobilization Media; Kinetic Study; Natural Zeolite Palm Oil Mill Effluent

BIO2 - 7

Evaluation of a Pilot-Scale Anaerobic Fluidized Bed Reactor for Landfill Leachate Treatment during Start-Up Period

Wiratni Budhijanto[a,b]*, Hanifrahmawan Sudibyo[a,b], and Sholahudin Al Ayyubi[a]

[a]Chemical Engineering Department, Faculty of Engineering, Universitas Gadjah Mada, Jl. Grafika 2 Yogyakarta 55281 Indonesia
[b]Center for Energy Studies, Universitas Gadjah Mada, Sekip K-1A Yogyakarta 55281 Indonesia

The accumulation of municipal solid wastes (MSW) in Indonesian cities is increasing. For example, in Yogyakarta Province, 400-500 ton/day of unsorted MSW is produced and dumped in the land fill site called Piyungan. The accumulated MSW in Piyungan landfill site produces excessive leachate. Leachate is the aqueous effluent generated from MSW accumulation by the rain water percolation and the water content of the waste itself. Piyungan landfill site produces10-15 m3/day of leachate, which depends upon the rainfall rate in the region.

Anaerobic digestion is an efficient choice to clean up the leachate before it is emitted to the nearby stream. The high organic content in the leachate makes it a potential for methane production. The anaerobic process usually suffers for long start up and stabilizing period. In this study, an anaerobic fluidized bed reactor (AFBR) was chosen based on the consideration that the particles added as the microbial immobilization media would accelerate the biofilm stabilization.

A pilot plant of mini AFBR (capacity of 1.5 m3 of leachate/day) has been installed in Piyungan Landfill Site. This study investigated the hydraulic retention time (HRT) variations during the start-up period which gave the best result in term of the accelerated stabilization of the AFBR. The approached used in this study was mathematical modeling combined with field data. This study showed that for the case of landfill leachate from Piyungan Landfill Site (Yogyakarta), with the hydraulic retention time (HRT) for the pilot scale AFBR of one day, the performance of the AFBR was unstedy for the first three weeks with respect of soluble chemical oxygen demand (sCOD) removal, volatile fatty acid (VFA) concentration, and biogas production. When the steady state was reached in the fourth week, the sCOD removal efficiency reached 75%. Although the biogas production was not high, the AFBR was efficient in lowering the sCOD content in the leachate and hence will significantly reduce the cost of chemicals and energy for aerated pools.

Keywords:

Anaerobic Digestion; Fluidized Bed Reactor; Landfill Leachate; Wastewater Treatment; Biogas; Start Up

Production Biopesticide based on Sisteine Protease Enzyme from Latex and Piece of Papaya (*Carica papaya*) for Spodoptera Litura in Red Chilli Pepper (*Capsicum annuum*)

Tania Surya Utami[1], Danti Firda Nur[1], Nadia Tuada Afnan[1] Muhamad Sahlan[1], Anondho Wijanarko[1], Misri Gozan[1], Heri Hermansyah[2*]

[1]Department of Chemical Engineering, Faculty of Engineering, University of Indonesia, 16424 Depok, Indonesia
[2]DRPM Universitas Indonesia, University of Indonesia, Depok 16424, Indonesia
** heri@eng.ui.ac.id*

Spodoptera litura is one of the major pests on red chilli pepper (Capsicum annum). Larvae damage crops by biting, chewing and then eating the lower surface of the leaves. The leaves will become transparent white, severe damage leaves behind only leaf bone. Papaya latex (Carica papaya) could be used as a pesticide because it contains sisteine protease which substances that can inhibit eating even to kill insects pests. The purpose of this study was to produce organic pesticide of the sisteine protease extract from papaya latex against Spodoptera litura.The design used was a completely randomized design with latex from papaya leaf, papaya rind and papaya rod. The method used is blending and tapping. Blending method will be continue with chemicall extraction will be used buffer phosphate and and ammonium sulfate. Tapping method will be continue with chemical extraction will be used asetone . That method will be compared with enzyme activity test and efficacy test. Enzyme activity test will be used UV-Vis spectrophotometer and efficacy test will be used flyblow of Spodoptera litura who give red chilli pepper leaf which contain organic pesticide from sisteine protease.

Keywords:

Biopesticide; Papaya Latex; Red Chilli Pepper; Sisteine Protease; Spodoptera litura

Identification and Classification of Honey's Authenticity by Atr-Ftir Spectroscopy and Chemometric Method

Seffiani[1], Heri Hermansyah[1], Anondho Wijanarko[1], Etin Rohmatin[2], Muhamad Sahlan[1,3*]

[1]*Departement of Chemical Engineering, University of Indonesia, Depok, 16424, Indonesia*
[2] *Midwifery Department of Health Polytechnic Republic of Indonesia's Health Ministry, Tasikmalaya, Indonesia*
[3]*Research Center of Biomedical Engineering, University of Indonesia, Depok, 16424, Indonesia*
[*] *sahlan@che.ui.ac.id*

Honey is a natural product produced by honeybees from various secretions of plants, and it has many benefits, especially for human's healthiness. Authentication of honey has importance for both industries and consumers because until now; there is no guarantee of honey's authenticity especially in Indonesia. As for the classification of honey bees, is based on the fact that the content of honey produced between *Apis sp.* and stingless bees (most widely harvested honey bees in Indonesia) have differences. Honey from stingless bees is much more expensive than *Apis sp*. because the yield of honey per colony is never very high. Current rapid detection methods like a raw fish test, turbidity test, foam test, test with ants usually either have challenges for the accuracy. In this experiment, there is an alternative testing to identify the authenticity of honey by using Attenuated Total Reflectance Fourier Transmission Infrared Spectrometer (ATR-FTIR) with the range of wavelengths between 550 - 4000 cm^{-1}. By using ATR-FTIR, the spectrum of each sample for real and fake honey were obtained and plotted using the chemometric discriminant method. Real honey's samples have been achieved from the local honey bees breeder from all around Indonesia while the fake honey were made from the mixture of water, sugar, $NaHCO_3$, and real honey. Data were collected using OMNIC software and processed using TQ Analyst software. This method was able to differentiate the authenticity and classification of honey based on the honey's spectrum. For identification of authenticity purpose, there were 2 classes formed, real and fake honey, the best region which can differentiate them are 4 regions: 1700 -1600 cm^{-1}, 1540 - 1175 cm^{-1}, 1175 - 940 cm^{-1} and 940 - 700 cm^{-1}. For classification purpose, there were 2 classes formed based on the type of honey bees, *Apis sp.* and stingless bees, the best region specifically is 1700 -1600 cm^{-1}. This study aimed to obtain a method that can detect the authenticity and classification of honey which is fast, precise, and accurate.

Keywords:

Apis sp.; ATR-FTIR; Discriminant; Distance Analysis; Spectrum; stingless bees

BIO3 - 3

Modeling Lab-Sized Anaerobic Fluidized Bed Reactor (AFRB) for Palm Oil Mill Effluent (POME) Treatment: from Batch to Continuous Reactors

Muhammad Mufti Azis*, Hanifrahmawan Sudibyo, Wiratni Budhijanto

Chemical Engineering Department, Faculty of Engineering, Universitas Gadjah Mada, Jln. Grafika 2, Kampus UGM Yogyakarta, Indonesia
*Corresponding author: muhammad.azis@ugm.ac.id

Indonesia is aiming to produce 30 million tones/year of crude palm oil (CPO) by 2020. As a result, 90 million tones/year of POME will be produced. POME is highly polluting wastewater which may cause severe environmental problem due to its high chemical oxygen demand (COD) and biochemical oxygen demand (BOD). Due to the limitation of open pond treatment, the use of AFBR has been considered as a potential technology to treat POME. This study aims to develop mathematical models of lab-sized Anaerobic Fluidized Bed Reactor (AFBR) in batch and continuous processes. In addition, the AFBR also utilized natural zeolite as an immobilized media for microbes. To initiate the biomass growth, biodiesel waste has been used as an inoculum. In the first part of this study, a batch AFBR was operated to evaluate the COD, VFA and CH_4 concentrations. By comparing the batch results with and without zeolite, it showed that addition of 17 g/gSCOD zeolite gave larger COD decrease within 20 days of operation. In order to elucidate the mechanism, parameter estimations of 12 kinetic parameters were proposed to describe the batch reactor performance. The model in general could describe the batch experimental data well. In the second part of this study, the kinetic parameters obtained from batch reactor were used to simulate the performance of double column AFBR where the acidogenic and methanogenic biomass were separated. The simulation showed that a relatively long residence time (Hydraulic Residence Time, HRT) was required to treat POME using the proposed double columns AFBR. Sensitivity analyses was conducted and revealed that μ_{m1} appeared to be the most sensitive parameters to reduce the HRT of double columns AFBR.

Keywords:

POME; AFBR; natural zeolite; modeling; batch reactor; continuous reactor; COD; VFA; CH_4

Diuretic Effect of Jamu Antiatherosclerosis by in Vivo Testing on Male Rats

Dewi Tristantini[1*], Clarissa Ancella[2]

[1]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*
[2]*Chemical Engineering Department, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

Hypertension has become the worldwide's focus because mortality rate due hypertension is increasing every year. One of the antihypertensive drug is diuretic which cause a decrease in blood pressure. Active substances provide a diuretic effect is a flavonoid. Flavonoid in combination of bullet wood leaves, curcuma and starfruit leaves empirically proven, research and published in decrease blood sugar levels, decrease cholesterol and improve blood circulation. The combination of bullet wood leaves, curcuma and starfruit leaves become jamu antiatherosclerosis. Jamu antiatherosclerosis extracted using reflux so particle size affects the flavonoid produced. Particle size jamu antiatherosclerosis is smaller than 60 mesh so jamu antiatherosclerosis which has the highest apigenin and catechin is particle size smaller than 60 mesh. The method used is testing *in vivo* to male rats (*Rattus norvegicus*). The study used 6 group of rats are normal control (without treatment), negative control (induced NaCl and standard feed), positive control (captopril 0.72 mg), dose I (13.2 mg herb), dose II (26.4 mg herb) and dose III (52.8 mg herb). Data retrieval urine volume and blood pressure of the rats were taken within 21 days. The data showed that diuretic activity jamu antiatherosclerosis dose I was 0.724, dose II was 0.792 and dose III was 0.843. The results showed that caused an increase in urine volume in which higher diuresis effect is achieved by increasing the amount of extract. This research conclude that jamu antiatherosclerosis can use as an inexpensive diuretic herbs in lowering blood pressure and the results can be used to improve public welfare.

Keywords:

Diuretic; Antihypertensive; Tanjung leaves (Mimusops elengi L.); Starfruit leaves (Averrhoa carambola L.); Curcuma (Curcuma xanthorrhiza L.); Particle size

BIO3 - 5

Making Hard Candy containing Honey as a Nutrient-Rich Food Product

Atikah Ridhowati[1], Heri Hermansyah[2], Anondho Wijanarko[3], Muhamad Sahlan[4]*

[1234]*Department of Chemical Engineering, University of Indonesia, Depok, 16425, Indonesia*
[4]*Research Center of Biomedical Engineering, University of Indonesia, Depok, 16425, Indonesia*
[1]*atikah.ridhowati@ui.ac.id*
[2]*heri@eng.ui.ac.id* [3]*anondho@eng.ui.ac.id*
[4]*sahlan@eng.ui.ac.id*

Candy is a food product that is favored by all circles of society both by children and adults. Consumers' interest in candy is high especially on hard candy can be an opportunity for producers to be a profitable business, but because this candy is very common for people to eat, producers usually rarely pay attention to the nutritional content in making candy. Therefore, the need for a new innovation is to make hard candy with honey base material. Honey is a natural sweetener produced by bees from the flower nectar. The main component of honey is sugar consisting of glucose and fructose, water and other components such as amino acids and proteins. The experimental design used was a Completely Randomized Design with 12 treatments and 4 types of honey consisting of a comparison of variations between honey, sucrose, glucose syrup and water. Research stages include honey preparation, hard candy making, chemical test (moisture content and ash content), physical properties test (color analysis), organoleptic test, and data analysis using ANOVA (analysis of varian). The results showed that the most optimal concentration of honey, sucrose, glucose syrup and water to produce hard candy was 31%: 24%: 24%: 6% in terms of organoleptic test and has fulfilled SNI 3547.1: 2008 when viewed from moisture content 0.17 - 0.49% and ash content 0.0508 - 0.0997%.

Keywords:

Candy; Hard Candy; Honey; Food Product

BIO3 - 6

Effect of Biofilm and Selective Mixed Culture on Microbial Fuel Cell for The Treatment of Tempeh Industrial Wastewater

Rita Arbianti, Tania Surya Utami*, Vifki Leondo, Elisabeth, Syafira Andyah Putri,

Heri Hermansyah

Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Depok 16424, Indonesia

Microbial Fuel Cell (MFC) provides a new alternative in the treatment of organic waste. MFC produces 50-90% less sludge to be disposed of than other methods. MFC technology can utilize existing microorganisms in the waste as a catalyst to generate electricity and simultaneously also serves as a wastewater treatment unit itself. Tempeh wastewater is one of the abundant industrial wastewater which can be processed using MFC. Research using the selective mixed culture is very likely to do due to the good result on COD removals by adding mixed culture. Microorganisms in tempeh wastewater consist of bacteria gram positive and gram negative. This study focused on the aspects of waste treatment which is determined by decreased levels of COD and BOD. Variations in this study are the formation time of biofilm and the addition of selective gram. MFC operated for 50 hours. For a variation of biofilm formation, experiments were performed after incubation by replacing incubation substrates used in the formation of biofilms. Biofilm formation time in this study was 3 days, 5 days, 7 days and 14 days. Gram positive and gram negative bacteria were used in selective mixed culture experiments. Selective mixed culture added to the reactor by 1 mL and 5 mL. Selection of gram-positive or gram-negative bacteria carried by growing mixed culture on selective media. COD and BOD levels were measured in the wastewater before and after the experiment conducted in each variation Biofilm formation optimum time is 7 days which decrease COD and BOD levels by 18.2% and 35.9%. The addition of gram negative bacteria decreases COD and BOD levels by 29.32% and 51.32%. Further research is needed in order to get a better result on decreasing levels of COD and BOD.

Keywords:

Biofilm; BOD; COD; Microbial fuel cell; Tempeh wastewater

BIO4 - 1

Reactor Design for Levulinic Acid Production from Palm Oil Empty Fruit Bunches

Jabosar Ronggur Hamonangan Panjaitan[1], Dewi Tristantini[1],
Rizal Alamsyah[2], Misri Gozan[1*]

[1]*Chemical Engineering Department, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[2]*Center for Agro-Based Industry, Bogor 16122, Indonesia*
** mrgozan@gmail.com; mgozan@che.ui.ac.id*

The extent of Indonesian palm oil plantation and Indonesian palm industry cause large byproduct such as palm oil empty fruit bunches (POEFB). POEFB is lignocellulose biomass that consist of cellulose, hemicellulose, and lignin, thus POEFB can be converted into various biochemical products. Cellulose fraction in POEFB can be hydrolyzed into levulinic acid (LA), a biodiesel platform replacing fossil fuels. LA can be produced by acid catalyst depolymerizes of POEFB into glucose, which then dehydrated to 5–hydroxylmethylfurfural (HMF) and rehydration to form LA. Researches about LA production, kinetic study of LA production and model simulation of LA reactor had been done. However, no studies have examined about reactor design specifications to produce LA from biomass. Therefore, objective of this research is to investigate kinetic reaction parameters to design LA reactor from POEFB. Kinetic reaction experiments were done in 1 liter pressurized vessel with 1M sulfuric acid as catalyst at temperature 150, 160 and 170^{o}C. The result shows that the activation energies of cellulose to glucose; glucose to HMF; glucose to humid; and HMF to LA were 135.66; 155.30; 112.84; and 107.81 kJ/mol respectively. LA reactor construction material was Stainless Steel 316 with steam jacket as heater. It can be conclude that continuous stirred tank reactor with 6-pitched blade turbine impeller was proved as reactor type because it more efficient to produce LA. For 100 kg/hour POEFB in capacity, LA reactor volume is 14.5 m^3 with 2.64 m in diameter and 6.17 m in height.

Keywords:

Reactor Design; Palm Oil Empty Fruit Bunches; Acid Hydrolysis Reaction; Levulinic Acid; Kinetic Reaction

Discrimination of Several Indonesian Specialty Coffees Using Fluorescence Spectroscopy Combined with Simca Method

Diding Suhandy[1], Meinilwita Yulia[2]

[1]Department of Agricultural Engineering, Faculty of Agriculture, The University of Lampung, Jl. Prof. Dr. Soemantri Brojonegoro No.1, Bandar Lampung, 35145, Indonesia
[2]Department of Agricultural Technology, Lampung State Polytechnic, Jl. Soekarno Hatta No. 10, Rajabasa Bandar Lampung, Indonesia
diding.sughandy@fp.unila.ac.id

Indonesia is one of the important producers of several specialty coffees, which have a particularly high economic value, including Civet coffee (‘kopi luwak’ in Indonesian language) and Peaberry coffee (‘kopi lanang’ in Indonesian language). The production of Civet and Peaberry coffee is very limited. In order to provide authentication of Civet and Peaberry coffee and protect consumers from adulteration, a robust and easy method for evaluating ground Civet and Peaberry coffee and detection of its adulteration is needed. In this study, we investigate the use of fluorescence spectroscopy combined with SIMCA (soft independent modelling of class analogies) method to discriminate three Indonesian specialty coffee: ground Peaberry, Civet and Pagar Alam coffee. Total 90 samples were used (30 samples for Civet, Peaberry and Pagar Alam coffee, respectively). All coffee samples were ground using a home-coffee- grinder. Since particle size in coffee powder has a significant influence on the spectra obtained, we sieved all coffee samples through a nest of U. S. standard sieves (mesh number of 40) on a Meinzer II sieve shaker for 10 minutes to obtain a particle size of 420 µm. The experiments were performed at room temperature (around 2729°C). All samples were extracted with distilled water and then filtered. For each samples, 3 mL of extracted sample then was pipetted into 10 mm cuvettes for spectral data acquisition. The EEM (excitation-emission matrix) spectral data of coffee samples were acquired using JASCO FP-8300 Fluorescence Spectrometer. The principal component analysis (PCA) result shows that it is possible to discriminate types of coffee based on information from EEM (excitation-emission matrix) spectral data. Using SIMCA method, the discrimination model of Indonesian specialty coffee was successfully developed and resulted in high performance of discrimination with 100% of sensitivity and specificity for Peaberry, Civet and Pagar Alam coffee. This research has opened the possibility to develop a promising method to detect and evaluate authentication of Indonesian specialty coffees using fluorescence spectroscopy.

Keywords:

Authentication; Discrimination; Fluorescence Spectroscopy; Specialty Coffee; SIMCA Method

BIO4 - 3

Ozone Technology for Pathogenic Bacteria of Shrimp (Vibrio sp.) Disinfection

Ria Wulansarie[1]*, Wara Dyah Pita Rengga[1], Rustamadji[1]

[1]*Chemical Engineering Department, Engineering Faculty, Universitas Negeri Semarang, Semarang, Indonesia, 50229*

One of important marine commodities in Indonesia, shrimps are susceptible with Vibrio sp bacteria infection. That infection must be cleared. One of the technologies for disinfecting Vibrio sp. is ozone technology. In this research, Vibrio sp. is a pathogenic bacterium which infects Penaeus vannamei. Ozone technology is applied for threatening Vibrio sp. In this research, ozonation was performed in different pH. Those are neutral, acid (pH=4), and base (pH=9). The sample was water from shrimp embankment from Balai Besar Perikanan Budidaya Air Payau (BBPBAP) located in Jepara. That water was the habitat of Penaeus vannamei shrimp. The brand of ozonator used in this research was “AQUATIC”. The used ozonator in this research had 0,0325 g/hour concentration. The flow rate of sample used in this research was 2 L/minute. The ozonation process was performed in continuous system. A tank, pipe, pump, which was connected with microfilter, flowmeter and ozone generator were the main tools in this research. It used flowmeter and valve to set the flow rate scalable as desired. The first step was the insert of 5 L sample into the receptacle. Then, by using a pump, a sample supplied to the microfilter to be filtered and passed into the flow meter. The flow rate was set to 2 LPM. Furthermore, gas from ozonator passed to the flow for the disinfection of bacteria and then was recycled to the tank and the process run continuously. Samples of the results of ozonation were taken periodically from time 0, 3, 7, 12, 18, 24 to 30 minutes. The samples of the research were analyzed using Total Plate Count (TPC) test in BBPBAP Jepara to determine the number of Vibrio sp. bacteria. The result of this research was the optimal condition for pathogenic bacteria of shrimp (Vibrio sp.) ozonation was in neutral condition.

Keywords:

pH, Ozone, Vibrio sp, Shrimp, Disinfection, Shrimp Embankment, Pathogenicic Bacteria

BIO4 - 4

Lipase Biocatalyst Immobilization from Solid State Fermentation of Palm Oil Empty Fruit Bunches, Bagasse, and Palm Oil Sludge with Adsorption-Cross Linking Method in Anion Macroporous Resin

Yessica Hannauli S[1], Tania Surya Utami[1], Ambar Maresya[1], Muhamad Sahlan[1], Anondho Wijanarko[1], Misri Gozan[1], Heri Hermansyah[1*]

[1]Department of Chemical Engineering, Faculty of Engineering, University of Indonesia, Depok, West Jawa, 16424, Indonesia

Enzymes are used to make a production of biomass based process more efficient and more selective. Lipase is a biocatalyst in the breakdown of fat reaction that is widely used in the industry, including the industry in Indonesia. Lipase production can be carried out by bacterial solid state fermentation by using agro-industry waste substrate containing carbon and nitrogen. The developments of various industrial sectors are demanding the use and application of lipase commercially in industrial processes as biocatalysts chosen by its ability to work in a friendly environment and have high specificity. Fermentation of *Aspergillus niger* are able to produce enzyme lipase that can be done by using solid-state fermentation method. In this study palm oil empty fruit bunches (POEFB), bagasse, and palm oil sludge are used as fermentation substrates and will be treated variations of *inducer* concentration and fermentation time. The results of solid state fermentation of solid substrates POEFB with *inducer* concentration of 8% for 7 days showed the highest activity value of 2.2 U/mL and 8.2 U/mL in the form of dry extract lipase. The result of the dry lipase enzyme will be immobilized so that enzyme is stable in repetitive use with adsorption-cross linking method using *macroporous* resin as a support. Experiments show us that empty fruit bunches of oil palm fermentation substrate can produce lipase enzyme with enzyme loading of 56.6% wt. Enzyme activity test carried out in the synthesis of biodiesel through interesterification reaction mole ratio of reactants palm oil and metal acetate 1:12 at 40^{o}C operating temperature conditions for 50 hours in 4 reaction cycles. Biodiesel synthesis results were analyzed using High Perfomance Liquid Chromatography (HPLC) showed biodiesel yield values of 48.6% and the enzyme was able to move up to 68.60% initial yield of 4 cycles of biodiesel synthesis.

Keywords:

Lipase Immobilization, Cross Linking, Adsorption, agro-industrial waste

BIO4 - 5

Phytochemicals Screening, Antioxidant Activities, Total Phenolic and Flavonoids content of *Sansevieria trifasciata* and *Sansevieria cylindrica*

Whika Febria Dewatisari[1], Rosalita Agustini[2]

[1]dewatisari@whika.web.id, [2]rosalita@ecampus.ut.ac.id

Sansevieria is commonly known not only as both in and out door house plant but also useful as an antibacterial. The research showed *S. trifasciata* indicate positif of flavonoids, alkaloids, and steroids, *S. cylindrica* containing phenols, proanthocyanidins, and flavonoids that have the potential to antibacterial and antioxidant. (Mahardika et al, 2013 and Afolayan, 2013). The presence of natural substances in the leaves of *Sansevieria* which works as an antioxidant, is expected to decreased of cancer cells. The research aims to examine the content of active substances, antioxidant activity and total phenols and flavonoid of the *S. trifasciata* and *S. cylindrica* leaves. Testing of antioxidant activity is carried out by spectrophotometry method using a dephinylpicril hidrazil (DPPH). DPPH method is intended to determine the parameters of equivalent concentration of 50% gives the effect of antioxidant activity (IC50).The results showed 1) *Sansevieria trifasciata* and *Sansevieria cylindrica* has active compounds such as triterpenoids and steroids, saponins, phenols, flavonoids, quinones, and alkaloids, 2) *Sansevieria trifasciata* and *Sansevieria cylindrica* have potential of antioxidant, which Sansevieria trifasciata has IC50 4:45 ug / ml and *S. cylindrica* that has IC50 3.5 ug / ml. 3) *S. trifasciata* contains phenols and flavonoids were higher than *S. Cylindrica.*

Keywords:

Screening of phytochemicals, antioxidant activity, total phenols and flavonoids, S. trifasciata, S. cylindrica

BIO4 - 6

CO2 Absorption from Biogas by Glycerol: Conducted in Semi-Batch Bubble Column

Pratiwi Puji Lestari, Aswati Mindaryani, Sang Kompiang Wirawan

Department of Chemical Engineering Gadjah Mada University, Yogyakarta 55281 Indonesia

Biogas is renewable energy source that has been developed recently. Methane is the main component of biogas with carbon dioxide (CO_2) as the highest impurities. The quality of biogas depends on the CO_2 content, the lower CO_2 levels, the higher biogas quality. Absorption is one of the methods to reduce CO_2 level. The selection of absorbent and appropriate operating parameters are important factors in the CO_2 absorption from biogas. This study aimed to find out the design parameters for CO_2 absorption using glycerol that represented by the overall mass transfer coefficient (K_La) and Henry's constant (H). This study was conducted in semi-batch bubble column with the diameter of 6 cm and a height of 20 cm. Mixed gas (40% CO_2 and 60% N_2) was contacted with 96% glycerol in a bubble column. The concentration of CO_2 in the feed gas inlet and outlet columns were analyzed by GC (Gas Chromatograph). The variables observed in this study were superficial gas velocity at 0.0056 m/s; 0.0062 m/s; 0.0073 m/s, and temperatures at 293 K; 313 K; 333 K. The results showed that CO_2 absorption capacity of glycerol is 1.5 $mol_{CO2}/L_{glycerol}$. Higher superficial gas velocity and lower temperature increased the rate of absorption process and the amount of CO_2 absorbed. Henry's constant values (H) at various temperatures were found about 0.0165; 0.0289; 0.0340 respectively and the relationship between H value and the temperature indicated by the equation ln(H)=16.289-(2278)1/T. The overall mass transfer coefficient value (K_La) at various superficial gas velocity were 0.102; 0.108; 0.133 respectively.

Keywords:

Biogas; CO_2 absorption; Glycerol; Henry constant; The overall mass transfer coefficient

BIO4 - 7

Effect of Some Variable in Cellulase Production by *Aspergillus niger ITBCC L74* using Solid Fermentation

Busyairi Abdullah, Maftukhah Siti, Listyaningrum Erna, Faradhiba Febrina

Chemical Engineering Department, Engineering Faculty, Diponegoro University
Prof. Soedarto, SH Street, Kampus Undip Tembalang, Semarang, Indonesia 50275
abd_busairi@yahoo.com

Cellulase is a very important enzyme for ethanol production, food, papper, etc, from lignocellulose and others**.** Rice straw and corn cob are the largest agricultural waste in Indonesia, while the water hyacinth weed is a plant that has not been used optimally. The content of cellulose is high enough on rice straw, water hyacinth and corn corb so it can be used as a substrate in the production of cellulase to increase the economic value of the rice straw, hyacinth, and corncob. As for the purpose of this study is to use the rice straw, water hyacinth, and corn cob as substrates of cellulase enzyme, determine the effect type of substrates, moisture content and fermentation time in production of cellulase enzyme and also determining the optimum conditions for production of cellulase enzymes. The method is solid fermentation system and using fungi *Aspergillus niger ITBCC L74* as inoculum. The variable used were fermentation time is 2 , 4 , 6 , 8 and 10 days, moisture content is 50, 60, 70, and 80%, as well as the type of substrate is rice straw, water hyacinth, and corn cob. The results showed that the highest protein content in the crude enzyme of the rice straw, water hyacinth and corncobs @ is 0.0153 mg/ml, 0.0194 mg/ml and 0. 0146 mg/ml, respectively. The optimum enzyme activity were for the rice straw, water hyacinth and corn cobs @ 2.569 U/ml, 1.606 U/ml and 1.302 U/ml, respectively. The optimum moisture content were obtain for rice straw, water hyacinth and corn cob respectively 80%, 70% and 60%. And the optimum fermentation time for rice straw, corn cob, and water hyacinth is on the sixth day. In this study showed the highest enzyme activity on the type of rice straw substrate with a water content of 80% and fermentation time 6 day.

Keywords:

Cellulase enzyme; Aspergillus niger; rice straw; water hyacinth; corn cob

BIO4 - 8

Ozone Disinfection of *Vibrio vulnificus* in Shrimp Pond Water

Wara Dyah Pita Rengga [1]*, Echa Cahya Julyta Putri[1], Ria Wulansarie[1], Agus Suryanto[2]

[1]*Chemical Engineering Department, Universitas Negeri Semarang, Kampus Sekaran Gunungpati, 50229, Indonesia*
[2]*Electrical Engineering Department, Universitas Negeri Semarang, Kampus Sekaran Gunungpati, 50229, Indonesia*

One variety of shrimp, *L.Vanamei*, often uses brackish water during the operation in the shrimp pond. Chlorination and ultraviolet are usually used for disinfection of brackish water. However, it is ineffective and forms sediment in the water distribution. It can be a negative impact on the water quality cause a contamination on the shrimp, so the farmers might have loss of profit because *Vibrio vulnificus* causes infection and dead on the shrimp. It affects the safety of consumers and should be minimized. The purpose of this study is to reduce the number of *V. vulnificus* bacteria in the pond water. The water was put in the storage tanks then pumped to filter out the impurities of the water. Furthermore, the water set the flow rate in 1 LPM, 2 LPM, and 3 LPM. After that, the ozone was injected to the water flow to sterilize the *V. vulnificus* bacteria. Finally, the water was returned to the original tank. The water from the tank was taken through a valve and analyzed in 0, 3, 7, 12, 18, 24, 30 minutes. The sample was analyzed immediately using a Total Plate Count method to determine the number of *V. vulnificus* bacteria in the shrimp pond water. The flow rate shows that the longer time of ozone made a lower amount of *Vibrio v*. bacteria. In 2 LPM water, it shows the optimum results of *V. vulnificus.* bacteria reduction for 88.1% compared to the flow rate of 1 LPM and 3 LPM with the bacteria reduction of 68,8% and 70.6%. This study shows that the ozone with a flow rate of 2 LPM circulation is the most effective method to help reducing the number of *V. vulnificus* in brackish water distribution system in the shrimp environment and potentially as a disinfectant.

Keywords:

Flow rate; Ozone; Shrimp pond water; Vibrio vulnificus

QiR

The Westin Resort
Nusa Dua, Bali

Poster

P

Investigation Anti Slagging Materials for Increasing Ash Fusion Temperature (AFT) in Pulverized Coal Combustion

Anton Irawan[a*], Dina Nur Izzati[a], Rahajeng Widiana Purwaningrum[a]

[a]Chemical Engineering Departement, Sultan Ageng Tirtayasa University
Jendral Soerdirman Km 3- Cilegon- Indonesia
** Corresponding author : antonirawan@untirta.ac.id*

Currently, demand for electricity in Indonesia is very high concurrently with the increasing life. Indonesia electrification rate in 2015 amounted to 88.3% and 11.7% without access to electricity. The government has planned the construction of power plants of 35000 MW until 2019 to increase the electrification rate in Indonesia. The power plants will use a wide variety of fuels including low rank coal. Indonesia has abundant of low rank coal with low energy value, high ash content and lower ash fusion temperature. The use of low rank coal for electricity generation has a particular problem with ash slagging. Slagging will be formed if the process temperature is higher than the ash fusion temperature (AFT). The fly ash will stick to the tubing to form a slag on the outside of the tubing in boiler. Slagging in pulverized coal combustion may lead to a slowdown in the heat transfer from the hot gas into the water in the tubing. This study was to investigate the materials of anti-slagging to increase AFT so that the risk of slagging in pulverized coal combustion process can be avoided. Three types of anti-slagging substances were rice husks, zeolite, and coal combustion catalyst. Method in this study was the blending of coal using the V-Blend with a composition mixing 1 (10%; 20%; 70%), mixing 2 (10%; 30%; 60%) and the mixing of 3 (10%; 40%; 50 %). Variations in the composition of the anti-slagging were used 2%; 4%; 6%. The composition of ash will be analyzed and the ash fusion temperature will be measured with reference to the standard ASTM D-1857. The results showed that variation of mixing 1 has the lowest AFT (1310˚C). Catalyst coal combustion was an anti-slagging most influential in increasing AFT up to 1370 °C. Components MnO_2 , Al_2O_3 and SiO_2 can increase the ash fusion temperature (AFT).

Keywords:

Electrification, Coal, Ash, Slagging, Ash Fusion Temperature, V- Blend

P - 2

Analysis Study Level Total Harmonic Distortion (THD) at Substation – Customer Distribution Substation Industry, Business and Household

[1]Albert Gifson, [2]Juara Mangapul, [3]Heri Suyanto

Lecturer, College of Engineering – PLN (Foundation for Education & Welfare PT. PLN (Persero)). PLN tower. Jl. Outer West Lingkar, Duri Kosambi, Cengkareng, Indonesia 11750
[1]albertdoang@yahoo.co.id
[2]juaramagapult_stmsi@yahoo.com
[3]heri.suyanto@yahoo.co.com

Harmonics is a symptom caused by his disability sinusoidal waveform of voltage or current permanent basis, with the occurrence of defects in the sinusoidal wave is then mathematically flawed sinusoidal wave can be decomposed into many pure sinusoidal wave with a frequency of integer multiples of the fundamental frequency. Symptoms harmonics are now often found in the distribution system in connection with many types of equipment especially those containing electronic components. Symptoms of harmonics that occur in the distribution system will cause some adverse impact on the operation of the distribution system including increased loss of power losses, increasing the temperature of operation of the equipment, and distort the gauge (cause inaccuracies in measuring tools). In the course of this research will be studied, researched and analyzed the levels of harmonics in various types of distribution substations Jakarta area, especially for congested areas such as load industrial areas, business centers, dense residential area. And is expected to make reference to the design of the filter with the capacitor value calculation formula used in the method for reducing the influence of the harmonic distortion.

Keywords:

Harmonics; Filters; Capacitors

P - 3

Evaluation of Seismic Tests for Pavement Assessment in Indonesia

Sri Atmaja P. Rosyidi[a,*], Siegfried[b], Nur Izzi Md Yusoff[c]

[a]*Universitas Muhammadiyah Yogyakarta, Jalan Lingkar Selatan Bantul Yogyakarta 55183, Indonesia*
[b]*Puslitbang Jalan dan Jembatan, Ministry of Public Works and Housing Bandung, Indonesia*
[c]*Universiti Kebangsaan Malaysia, Bandar Baru Bangi Selangor 43600, Malaysia*
** Corresponding author.*
E-mail address: atmaja_sri@umy.ac.id

The need for accurate, fast, economic, effective and nondestructive (NDT) evaluation of pavement systems is becoming ever more important. In the case of existing pavement structures, the evaluation is not only being done to assess the pavement structure for quality assessment and control purposes, but also more importantly to detect symptoms of deterioration at early stages to optimize cost-effective management. Seismic technique is one of efficient devices rapidly used for NDT evaluation of existing road-pavements. One of the main objectives in the development of the seismic technique is to create an in-situ tool allowing measurement of onset of deterioration at early stages. The technique also contributes to a more economic pavement management. The aim of this paper is to examine the applicability of the seismic tests (STs) for in pavement structural evaluation, detection of defects and distresses, and other uses relevant for pavement evaluation and condition monitoring. The STs incorporates three different seismic techniques, i.e., Seismic Body-Wave Technique, Seismic Surface-Wave Technique and Impact Echo (IE) Technique. In this paper, the STs was evaluated for implementation in evaluation and condition monitoring of several existing pavements sites in Indonesia. From the results, the structural pavement profiling and detection of voids or loss of support under pavements are clearly obtained using seismic analysis in cooperating with tomography analysis for producing the 2-dimensional (2D) pavement profile. Use of the STs in evaluation of complex base and soil subgrade layers in flexible and rigid pavements was also examined. The overall conclusion of the study is that the STs is a well tool for analysis system of seismic testing in the pavements. The seismic technique utilizes sound physical phenomena of wave propagation in layered elastic systems. The strongest capability of the STs is in evaluation of the properties of the paving layer, since those are being directly measured. The STs performed with minimum failures, simple and inexpensive testing. Other potential applications of the STs still need to be examined in subjects of characterization of delamination in pavements and evaluation of temperature induced modulus variations in asphalt concrete.

Keywords:

Pavement Evaluation; Seismic Testing; Surface Waves; Elastic Modulus; Shear Wave Velocity

P - 4

A Numerical Analysis on the Effects of Angle-of-Attack and Stagger on the Propulsion of Tandem Airfoil at High and Low Speed Flight

Anthony Christian, Sheila Tobing, Riccy Kurniawan

Atma Jaya Catholic University of Indonesia, Jl. Jend. Sudirman No.51, RT.5/RW.4, Karet Semanggi, Setia Budi, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta 12930, Indonesia

Since its commercialization as a mean of mass transportation, the design and development process of an aircraft mainly focus on increasing its speed and/or size. The shape of aircraft wing, which is the primary device for lift generation, has remained generally unchanged. A variety of wing configuration, tandem wing configuration, has been utilized on a number of aircraft, yet there is limited research published on the subject. This research aims to analyze the effects of stagger, which is the stream-wise distance between the forewing and the rear wing, in tandem wing configuration on the aerodynamic forces generated by the wings.
The analysis is conducted numerically using ANSYS Fluent version 17.1 on two-dimensional (2D) NACA 0012 tandem airfoils at three variations of stagger, 1.5 chord, 2 chord, and 3 chord in laminar (Re = 2 x 103) and turbulent flow (Re = 6 x 106). As a first step, a 2D model of NACA 0012 airfoil is created using Autodesk Inventor and then uploaded to ANSYS. Subsequently, the solver is validated against the published results of wind tunnel tests on NACA 0012 airfoil. The results of current numerical analysis are in a good agreement with the experimental data. The result of this study is that the tandem wing configurations flying in a turbulent flow regime experience a maximum increase in total lift (the total lift of fore- and rear wing) of 37% and a maximum decrease in total drag (the total drag of fore- and rear wing) of 3% in cases where the angle of attack of the rear wing is greater than that of the forewing. However, this increase in lift diminishes by a maximum of 11% and 10% as the stagger increases from 1.5 chord to 2 chord and from 2 chord to 3 chord, respectively. The effect of tandem wing configuration on laminar flow is that for several combinations of angles-of-attack, a maximum increase in lift of 241% and a maximum drop in drag of 23% were observed. This is caused by the flow separation on the airfoil that occurs early in laminar flow. Further study is necessary to gain a better insight on the effects of angle-of-attack on the propulsion of tandem wing airfoils in low Re regime.

Keywords:

Plunging Airfoil, Propulsion, Tandem Wing Flight, Unsteady Aerodynamics

P - 5

Modification of TiO_2 Single Crystal by Laser Radiation

Edvins Dauksta[a,b,*], Pavels Onufrijevs[b], Masaru Shimomura[a], Vygantas Mizeikis[a], Arturs Medvids[b], Kenji Murakami[a]

[a]*Shizuoka University, Johoku 3-5-1, Naka-ku Hamamatsu 432-8561, Japan*
[b]*Riga Technical University, Paula Valdena str. 3/7, Riga LV-1084, Latvia*

An influence of pulsed laser radiation on niobium doped rutile phase titanium dioxide (TiO_2) single crystal was investigated. In this study we have used 266 nm pulsed nanosecond Nd:YAG laser with pulse duration 3 ns and 10 Hz repetition rate at intensity of 56 MW/cm^2. TiO_2 rutile single crystal with 0.05% Nb doping was used in the experiments. Raman spectroscopy and electron back scatter diffraction (EBSD) patterns were used to determine a polymorph phase change after laser treatment. According to the Raman spectroscopy results, pristine TiO_2 single crystal entirely consists of rutile. Irradiation by the pulsed laser leads to the phase change from rutile to anatase by 10000 laser pulses at intensity of 56 MW/cm^2. With an increase of laser pulse number, the Raman spectra of rutile start to change, showing disturbance in the crystalline structure by 100 and 1000 laser pulses and appearance of anatase phase by 10000 pulses. The EBSD method was used as a complementary technique to Raman spectroscopy. According to the EBSD mapping, rutile crystal surface is converted to anatase phase after laser irradiation. The thickness of converted rutile is around 10 nm, which is estimated from the optical absorption coefficient of the TiO_2 at 266 nm. Moreover, EBSD data shows that formed anatase layer is polycrystalline, but with a preferred crystallographic orientation. We have found that irradiation onto the TiO_2 single crystal by highly absorbed nanosecond 266 nm laser radiation leads to the conversion of rutile to anatase. However, the phase transition from anatase to rutile is unusual for TiO_2 at ambient pressure. Therefore, we propose that laser induced localized high pressure and high temperature field is the cause of the unusual rutile to anatase transition. These findings can be used to develop nano and micro crystalline TiO_2 thin film laser processing technology for applications in photovoltaics and photocatalytics. It is known that the anatase is more favorable for photocatalytic applications. As well as anatase/rutile heterostructures can be implemented in dye sensitized and perovskite solar cells to improve photovoltaic efficiency.

Keywords:

Laser; TiO_2; Raman Spectroscopy; EBSD; Phase Transition; Anatase; Rutile

P - 6

Manufacturing Macro / Nano-Fiber Cellulose as Bio-Composite Filler from Sorghum Stalk Waste for Automotive Component Application

A. Sofiana, L. Chandra, Ismojo, A.S. Handayani*

Chemical Engineering Department, Indonesia Institute of Technology, Serpong and 15320, Indonesia
** Corresponding author.*
E-mail address:aniek.handayani@iti.ac.id

The increasing usage of polymer-based materials in automotive component industry is not equally covered with the supply of raw plastic materials. Plastic materials for automotive components are commonly taken from Petro Polymer (Petroleum-based Polymer) and because of its massive use; the petroleum is now gradually decreasing. In addition, Petro Polymer is considered as non-degradable materials, which can cause to the environmental pollution. For that reason, many researchers have developed environmental-friendly, sustainable, and degradable plastic materials. One of the alternatives is by using Bio-composite. Bio-composite Polymer is a Polymer-based material which uses natural fiber and Polypropylene (PP) as the matrix. However, the use of natural fiber has different characteristics with Polypropylene in which Fiber is categorized as Hydrophilic while Polypropylene is characterized as Hydrophobic. Those differences can possibly cause to the lowness of their compatibility and their mechanical features. One of the solutions to solve the problem is by modifying the Fiber using chemical approach. The amorphous in Fiber such as Lignin, Hemicelluloses, and wax firstly should be omitted in order to make the Fiber has a high mechanical feature. The present study used Sorghum Fiber taken from post-harvest waste or Sorghum juice residue that contained 32,4% of cellulose, 27% of hemicellulose, and 7% of lignin. The modification process used in this study is Alkalinization with variable concentration 5%, 10%, and 15% at 70˚C to remove the amorphous component in the Fiber. It was then continued with either acid hydrolysis with concentration H_2SO_4 25% or bleaching with concentration NaClO 1,7% and finally ended with asetilation with concentration CH3COOH 8% to lower down the hydrophilic features of the Fibers. Room temperature was chosen for Acid Hydrolysis, Bleaching and Asetilation process. An amphibilic material such as ap-g-phma (ammilopectin-graft-polyhexilmethacrylate) is used as the competible agent for the process to improve the compatibility of those materials when the Natual Fiber was blended with Polypropylene. The result of this research will produce Bio-cellulose composite macro / nano-fiber cellulose from waste sorghum with the appropriate mechanical properties, environmental friendly, which can be applied as an automotive material.

Keywords:

Biocomposite, Waste Sorghum, Polypropylene, Automotive Component, Ap-g-PHMA, Modified Fibers, Micro/Nanofiber Cellulos

P - 7

Developing Urban Planning in New City of Walini: Creating Benefits from High-Speed Train Project

Mohammed Ali Berawi[a*], Perdana Miraj[b,d], Teuku Yuri Zagloel[c], Abdur Rohim Boy Berawi[b], Revaldo Agdhitya[a]

[a]*Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Baru, Depok 16424, Indonesia*

[b]*Center for Sustainable Infrastructure Development, Faculty of Engineering, Universitas Indonesia, Kampus UI Baru, Depok 16424, Indonesia*

[c]*Department of Industrial Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Baru, Depok 16424, Indonesia*

[d]*Department of Civil Engineering, Faculty of Engineering, Universitas Pancasila, Srengseng Sawah, Jakarta 12640, Indonesia*

[*] *Corresponding author.*

E-mail address: maberawi@eng.ui.ac.id

Currently, the government of Indonesia continues to promote the infrastructure development in various sectors such as road, port, and also new railway lines. One of the mega project infrastructures that aim to increase the regional and national economic growth is High-Speed Train Jakarta – Bandung. It connects two major cities (Jakarta in North-West Part of Java Island and Bandung in South – West part of Java Island) which significantly contribute to the gross domestic product (GDP). Walini as one of the areas that will be connected by the high-speed train has huge potential to be developed. It has the potential commodity of agriculture such as tea and rubber, but others scheme of a city also available such as business city, government oriented city or IT-based city. The development of the new city of Walini requires proper planning and a comprehensive conceptual design which focus on the vision of initial blueprint direction of this city. The research thus aims to conduct a comprehensive study by considering potential and regional characteristic as well as added value to increase competitiveness in term of infrastructure, technology readiness and urban development. It will combine approaches from the qualitative perspective and quantitative investigation using an in – depth interview and life cycle cost as an evaluation tool to select the best alternative for the direction of city planning. This study produces a strategic recommendation for government and other related stakeholders about regional development and urban city planning for Walini as new Silicon Valley and Technology Park.

Keywords:

Agglomeration; Economic Impact; Infrastructure; Spatial Planning; Regional Development

P - 8

The Effect of Heating Temperature on Cytotoxicity and α-Mangostin Yield: Mangosteen Pericarp Juice and Mangosteen Extract

Kamarza Mulia, Fitria Hasanah, Elsa Krisanti

Chemical Engineering Department, Faculty of Engineering, Universitas Indonesia
Depok 16424, Indonesia
E-mail: kmulia@che.ui.ac.id

The pericarp of mangosteen (*Garcinia mangostana* L.) contains bioactive xanthones, with α-mangostin being the major component, has been known to possess antitumor, antiviral, and other pharmacological activities. In this study, the effect of elevated temperature during the preparation step of fresh mangosteen pericarp juice and mangosteen extract, on their α-mangostin yield and cytotoxicities was investigated. The cytotoxicity activity of fresh juice and mangosteen extract was investigated using the brine shrimp test. Heating the fresh pericarp mangosteen in water at 65^{o}C for 30 minutes prior to blending produced a juice with higher α-mangostin yield and cytotoxicity compared to the traditional way of blending the juice at room temperature. Increasing α-mangostin yield of 9%-w/w due to heating was also observed when mangosteen extract was heated at 65^{o}C, consistent with the increased cytotoxicity in terms of LC50 value of 0.71 ppm at room temperature to 0.01 ppm at 65^{o}C. It is concluded that the effect of temperature on α-mangostin yield was in line with the temperature effect on cytotoxicity activity in all samples of pericarp juice and mangosteen extract in ethyl acetate fraction. The results of this study indicate that the extract of mangosteen pericarp obtained from the ethyl acetate fraction of the ethanolic extract has the potential to be used for anti-cancer medication.

Keywords:

Garcinia mangostana L.; Mangosteen; α-Mangostin,; Cytotoxicity; Heating Effect

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Effect of MWCNT on Properties and Flux of Chitosan/PEG Based Ultrafiltration Membranes

Fitri Khoerunnisa*, Hendrawan, Dwi Rizki Primastari, Riska Agiawati

Department of Chemistry, Indonesia University of Education, Setiabudi 229 Bandung 40154, Indonesia
** Corresponding author.*
E-mail address:fitri.khoerunnisa@gmail.com ; fitri@upi.edu

Biopolymer are expected to be environmentally compatible and to have great potential application as membranes material. The effect of multiwalled carbon nanotubes (MWCNT) on properties and flux of composite membranes were evaluated in this study. The chitosan/ PEG based ultrafiltration membranes was succesfully synthesized via phase inversion method at the same ratio while MWCNT composition was varied. The synthesized membranes were characterized by mean of FTIR spectroscopy, scanning electron microscopy (SEM), and tensile strength measurement meanwhile the flux of membrane was measured by permeability test. The results showed that the optimum composition of MWCNT on membrane matrix was 1:2 (in volume ratio). The addition of MWCNT notably enhanced the mechanical properties of membranes as confirmed by % elongation/ forces values. The insertion of MWCNT remarkably increased the flux of menbrane up to 60 $L.m^2h^{-1}$ indicating the increase of porosity and hydrophilic properties of composite membranes as confirmed by contact angle and SEM images. The results inferred that chitosan/ PEG/ MWCNT based ultrafiltration membranes demonstrates the potential application for water purification. Future study on fouling properties and recyclability of these membranes are crucial to be investigated.

Keywords:

Membranes, Chitosan, MWCNT, PEG, Flux, Composites

P - 10

Entropy-based Analysis on Dynamic Video Dimming Algorithm for Energy Efficient OLED Displays

Peter Chondro[1], Shanq-Jang Ruan[2] and Chang-Chia Hua[3]

Department of Electronic and Computer Engineering, National Taiwan University of Science and Technology
Taipei City 106, Republic of China (Taiwan)
Email: [1] peterchondro.ee@gmail.com, [2]sjruan@mail.ntust.edu.tw, [3]luck89712@gmail.com

The active matrix light-emitting diode (AMOLED)
display is a prospective technology that delivers high color gamut and contrast with low power consumption. Nevertheless, the power drawn by an OLED pixel increases non-linearly with respect to the corresponding intensity that results in high power consumption on bright pixel emission. This study examines this trade-off and proposes a pixel-based intensity dimmer that suppresses any color alteration, while reducing the power consumption on AMOLED displays. The entropy-based analysis reduces the complexity by detecting significant scene change that triggers the subtractive parameter update. According to the experimental result, the proposed method converses more than 48% of power consumption on AMOLED displays with high perceptual quality and faster frame rate compared with other representative method.

Keywords:

Pixel Transformation; Power Law; Active Matrix Organic Light-Emitting Diode (AMOLED);

Perceptual Entropy; Dynamic Subtractive

P - 11

Evolution from a Door Bell into an IP Door Phone

Daniel Hofman[1,2], Jenq-Shiou Leu[1], Pavel Troller[2]

[1]National Taiwan University of Science and Technology
[2]Czech Technical University in Prague
hofmadan@fel.cvut.cz, jsleu@mail.ntust.edu.tw, patrol@sinus.cz

This work introduces a general view on an evolution of door communication systems. The work evaluates a current market of IP-based systems which currently consists mainly of more expensive devices targeted on business customers. The goal is to design a doorphone prototype based on an IP protocol with suitable functions and easy control for a less demanding user. The Raspberry Pi computer was chosen for development together with other suitable hardware to accomplish desired functions. The Linphone open-source project was used to implement phone functionality. The low price or open-source solutions were preferred when selecting ideal hardware and software to use. The conclusion evaluates how successful the implementation was while keeping the device affordable.

Keywords:

Internet Protocol, Session Initiation Protocol, Raspberry Pi, Linphone, Doorphone

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Optimization of Crude Xylanase Production from Oil Palm Empty Fruit Bunches

Khairul Hadi, Made Tri Ari Penia Kresnowati* and Tjandra Setiadi

Microbiology and Bioprocess Technology Laboratory, Department of Chemical Engineering, Faculty of Industrial Technology Institut Teknologi Bandung, Jalan Ganesha 10, Bandung 40132, Indonesia

The potential of oil palm empty fruit bunches (OPEFB) as lignocellulosic biomass will be utilized as the low-cost substrate for xylanase production in solid state fermentation of *Trichoderma viride* ITBCC R67. This particular enzyme has many applications in several industries including pulp and paper, food and beverages, as well as poultry or feed industries, with increasing market demand every year. A mixture of loosely ground OPEFB and Prado's liquid medium was used as the substrate for the fermentation, using dried rice immobilized *T.viride* spores as the innoculum. Several aspects of enzyme production such as cultivation time, innoculum size, OPEFB biomass solid loading to water ratio, and fermentor configuration were evaluated using a Plackett-Burman design experiment. The produced enzyme was then extracted using citrate buffer and analyzed by DNS's method. The evaluated fermentation conditions could give xylanase activity as high as 2177 IU/mL. Among parameters evaluated, the flask volume and solid loading respect to water ratio, were factors having statistically significant effects on the enzyme activity.

Keywords:

Cultivation Time; Flask Volume; Inoculum Size; OPEFB; Solid Loading; Solid-State Fermentation; Trichoderma viride; Xylanase

P - 13

Feature Extraction of Epilepsy Signal Using Sampling Technique

Hindarto Hindarto, Sumarno Sumarno
Informatics Engineering
Universitas Muhammadiyah Sidoarjo
Sidoarjo, Indonesia
hindarto@umsida.ac.id, sumarno@umsida.ac.id

Epilepsy is the brain disorder human, epilepsy Occurs Due Someone experiencing Excess to Electrical signals released by cells of the brain. Someone disturbed Due epilepsy resulted effect the convulsions and abnormal movements. Electroencephalogram (EEG) is a electrode sensor to detect electrical activity that exist in the human brain. EEG signal is a signal that is very complex and become a primary source of information for the study of brain function and neurological disorders. EEG signals the moment epileptic seizures have a characteristic pattern that enables healthcare professionals to distinguish from normal conditions. However, in visual analysis can not be done routinely, because the EEG signal generated from EEG monitoring system is very large and quite time consuming. Another problem that arises is the lack of clear differences in EEG signals between epileptic seizures and non epilepsi. Various methods have been done many researchers to classify someone who has epilepsy and who do not have epilepsy. Therefore in this study, researchers tried to classify someone who had epilepsy disorders and who do not have epilepsy disorders. Epilepsy signal data taken from public data that consists of data sets A, data sets B, data sets C, data sets D and data sets E. The data set consists of data on non epileptic ie data sets A and data sets B while data on epilepsy are data sets C, data sets D and data sets E. Signal data from Data sets A, data sets B, Data sets C, data sets D, and data sets E that have been taken, then performed the process of feature extraction. In this study, the sampling technique is a method for feature extracting of epilepsy signal. The sampling technique for feature extraction of the epilepsy signal that use is an average value, standard deviation value, maximum value and minimum value. After the feature extraction process, the next process is the classification of epilepsy signal and non-epilepsy signal. Epilepsy classification process signals using Backpropagation Neural Network. The results of the classification process of Backpropagation method of epilepsy signal with 20-10-15-1 obtained accuracy rate 87.5%.

Keywords:

Epilepsy; EEG ; Sampling Technique; Backpropagation; Classification

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Development of Instant Starter for Fermented Cassava Flour Production

Fathya Rahmina, M.T.A.P. Kresnowati*, Yazid Bindar

Department of Chemical Engineering, Faculty of Industrial Technology Institut Teknologi Bandung, Jalan Ganesha 10, Bandung 40132, Indonesia
** Corresponding author.*
E-mail address:kresnowati@che.itb.ac.id

Cassava is an important crop for tropical countries such as Nigeria, Brazil, Thailand, and Indonesia. Indonesia is the fourth country in the world's largest producer of cassava and in 2015 Indonesia produced approximately 25 million tons of cassava. With the appropriate application of food technology, cassava can be processed into a processed and preserved products with higher value added. For example cassava can be processed into fermented cassava flour (fercaf) that has low cyanogenic content, neutral color and aroma. Fermentated Cassava Flour (fercaf) is one of the products of cassava (*Manihot utilisima*) that has the potential to become an alternative food raw materials. One of the factors that affect the quality fercaf is a biological agent that acts on the fermentation process. Biological agent involved is *Bacillus subtilis*, *Lactobacillus plantarum*, and *Aspergillus oryzae*. In general, steady state microbial population was reached within 24 hours of fermentation for *B.subtilis* and *L.plantarum*, 96 hours for *A.oryzae*.The use of a specific microbial starter in the cassava chips fermentation for fercaf production will direct the fermentation process, maintaining high quality of the produced flour. It is the aim of this research to develop a method for preparing instant starter for fercaf production, extending the shelf life of the microbial culture and making it practical in use. The application of vacuum drying method for instant starter preparation and further starter storage condition will be evaluated. Various operation conditions such as drying temperature and types of carrier media such as cassava chips, cassava cubes, skim milk, fercaf as well as cold and room temperature storage will be tested based on a fractional factorial design experiment. Process performance will be parameterized by cell viability of the produced instant starter. It is expected that vacuum drying will minimize product loss at faster drying time, giving affordable instant starter preparation method.

Keywords:

Cassava; Cell Viability; Fercaf; Starter Culture; Vacuum Drying

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Numerical Analysis of the Bandwidth Enhancement of an Inverted F Antenna for UHF Channel at 639 MHz

Erfan Rohadi[a], Amalia[b*], Indrazno Siradjuddin[c]
Graduate School of Electronics Engineering Department
The State Polytechnic of Malang, Jl. Soekarno Hatta No. 9, Malang 65141, Indonesia
Email: [a]erfanr@polinema.ac.id, [b]amalia@polinema.ac.id, [c]indrazno@polinema.ac.id

Bandwidth characteristic enhancement of the antenna is interesting and challenging problems for antenna engineers. The low profile inverted F antenna (IFA) on a finite conducting plane with the designed frequency 639 MHz is proposed and its characteristics are analyzed numerically. The IFA is typically a narrowband antenna, due to the bandwidth enhancement the antenna parameters are considered. In this work, the antenna height (*h*), short stub (*Ls*) and size of conducting plane (*px* × *py*) are adjusted. However, the lengths of the horizontal element (*L* and *L1*) are optimized so that the input impedance matches at the designed frequency. The IFA consists of a semi-rigid coaxial cable with the radii of inner and outer are 0.255 mm and 1.095 mm, respectively. The antenna heights (*h*) are investigated at 23 mm, 30.7 mm and 38.3 mm. The lengths of short stubs (*Ls*) are adjusted at 15.3 mm, 21.5 mm, 26.1 mm and 30.7 mm. The size of conducting planes (*px* × *py*) has been investigated at 53.6 mm to 68.9 mm by 230 mm to 268 mm. The feed point is located between the end of the edge of the outer conductor and the front end of the inner conductors of the horizontal element. When the size of conducting plane is 115 mm by 230 mm, the return loss bandwidth (-10 dB) becomes 2.4 % and the gain becomes 6.58 dB. It is found that the return loss bandwidth becomes narrower when the height of the antenna is reduced. However, by extending the length of the short stub, the return loss bandwidth can be improved. The gains of IFA in all the calculation conditions are more than 6.5 dB. This means that the variation of the short stub lengths, the antenna heights and the size of conducting plane do not significantly affect the gain characteristics. In the numerical analysis, the electromagnetic simulator WIPL-D based on Method of Moment is used. The results show that the bandwidth enhancement of IFA is performed by extending the height of the antenna and enlarge the size of conducting plate. The proposed inverted F antenna is promising for the UHF channel receiver.

Keywords:

Bandwidth Enhancement; Inverted F Antenna; Method of Moment; Short Stub; WIPL-D

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The Utilization of Quick Response Code in E–Payment to Support Retail Business Transaction

Ferrianto Gozali, William Kristianto

Electrical Engineering Department
Faculty Of Industrial Technology, Trisakti University
Jakarta, Indonesia
ferrianto@trisakti.ac.id, kristiantowilliam@gmail.com

Retail business transactions using debit card or credit card issued by commercial banks are commonly used in many major cities. The increase in the number of transactions, types of cards, and banks involved, have been matched by the increase in criminal cases associated with card-based transactions. In this research, we developed a system using Quick Response (QR) Codes on personal mobile devices as an alternative to debit or credit cards. We aim to show that our approach is less prone to criminal activities compared to debit or credit cards. The transaction process begins with scanning of a QR Code using the camera on a user's mobile device to extract the token data encoded in the QR Code. This system utilizes security features built into the QR Code, such as Reed Solomon Code for Error Correction Code (ECC) and Advanced Security Standard (AES – 256), to encode the token data into the QR Code. The QR Code provides a reliable security mechanism for e – payments. Through the system's user interface, the transaction process will be recorded in a database and will be shown on the user's mobile device for transaction confirmation and payment. The system is tested with several factors related to the transaction process. Data size, ECC, and masking are factors that affect time to generate QR Codes. Distance and size are factors that affect the scanning of QR Codes on the user device. ECC and AES-256 encryption are factors that affect QR Code security and damage. Our test shows that the QR Codes can be used in the transaction process from beginning till payment facilitating the e-payment process of a retail business transaction.

Keywords:

E-Payment; QR Code; Retail; Encryption

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Advanced Oxidation Process via Ozonation of Cassava Starch for Psychochemical and Rheological Properties Enhancement

Siswo Sumardiono, Isti Pudjihastuti, Anggun Puspitarini Siswanto*, Edy Supriyo

Department of Chemical Engineering, University of Diponegoro, Jl. Prof. Soedarto, SH Tembalang, Semarang 1269, Indonesia
** Corresponding author.*
E-mail address: anggun.siswanto@live.undip.ac.id

Modification of cassava starch was produced by ozonation method. Ozone is well known as a strong oxidation agent which produces no by product after processing. The oxidised starch is widely used in the food processing. The purpose of modified starch is changing psychochemical and rheological characteristics. There are some characteristics that are desired by industries, such as stable viscosity in high and low temperature, resistance to mechanical treatment, and resistance of viscous force to acid and high temperature condition. This study aims to determine the effect of reaction conditions (pH and ozonation time) on physicochemical properties of cassava starch. The chemical and physicochemical properties of cassava starch oxidised by ozone under various pH of 7-11 and ozonation time between 30-300 minutes were studied. Results from the amount of ozone consumed during the course of reaction showed that the rate of starch oxidation was highest at the reaction pH of 7-8. These conditions also resulted in the highest formation of carbonyl group and the highest rate of viscosity reduction of the modified starch. However, the formation of carboxyl group was most favourable at the reaction pH of 8-9. The changes in viscosity of starch paste during storage at 50°C for 8 hours were also investigated. The results demonstrated that reaction pH drastically influenced the stability of starch paste especially for the samples prepared with the shorter reaction time (less than 120 minutes). It was found that modified starch prepared under the reaction pH of 10 and 11 showed an increase in the paste viscosity or even formed a gel during storage which indicated that the tendency for starch retrogradation prevailed in these samples. Nevertheless, oxidised starch obtained under the reaction pH of 8 and 9 exhibited a significant reduction in the paste viscosity during storage, suggesting that these modification conditions might result in oxidised starch with less stable molecular structure, thus degradation of starch molecules under aqueous suspension could occur.

Keywords:

Carboxyl Group; Cassava Starch; Oxidation; Solubility; Swelling Power

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Enzymatic Synthesis of Tuna Oil and Lauric Acid for Modified Lipid Production Using *Lipase Candida Rugora* as Biocatalyst

Anggun Puspitarini Siswanto*, Wahyuningsih, Isti Pudjihastuti

Department of Chemical Engineering, University of Diponegoro, Jl. Prof. Soedarto, SH Tembalang, Semarang 1269, Indonesia

Structured lipid synthesis has been well developed over a decade by modifying lipid especially to enhance functional properties and nutrients of lipids. Structured lipid can be synthesised by lipid interesterification biologically and chemically. Biological treatment via enzymatic process is more favourable due to its high and specific bio catalytic activities. Interesterification is also known as acidolyses stage in which hydrolysis is occurred by acid. Moreover, enzyme utilisation as a catalyst also considered as an eco friendly approach compare to chemical treatment. This research aims to study the effect of temperature and enzyme concentration to the resulted modified lipid. Experiments were conducted by applying various temperature and enzyme concentration to tuna oil as an experimental sample. Analysis of gliseride profile was performed by using Thin Layer Chromatograph while Gas Chromatograph was used for incorporation analysis of lauric acid. Profiles of gliserides after enzymatic synthesis were investigated. Results showed that optimum lipase concentration and reaction temperature was 10% and 50 °C, respectively. The mole ratio of fish oil and lauric acid was 1:10 in which resulted 62.80% (mol) of incorporated lauric acid. At an incubation time of 12 hours, triglyceride decreased in concomitant to an increase of incubation time. In contrast, diglyceride increased with an increase of incubation time. Further, at a temperature higher than 50 °C, triglyceride decreased with an increase of reaction temperature. The method of interesterification was proven to be effective in synthesis of specific structured lipids. The immobile *Lipase Candida Rugose*, can be successfully used for the synthesis of structured lipids from tuna oil with lauric acid. An optimum reaction temperature is 50 °C, lipase concentration of 10%, ratio of substrate (tuna fish oil: lauric acid) 1:10 and an incubation time of 12 hours. Profiles of gliseride after acidolyses enzymatic were 78.1% of triglycerides, 32.2% of diglyceride and 11.9% of monoglyceride.

Keywords:

Food Processing; Lipase Candida Rugora; Lipid Structure; Omega-3; Tuna Oil

CFD Modeling of Adsorption Behavior in Adsorbed Natural Gas Tank with Polyethylene Terephthalate Plastic Waste Based Activated Carbon

Yuliusman[a*], Nasruddin[b], A Sanal[a], A Bernama[a], F Haris[a], I T Ramadhan[a]

[a]*Chemical Engineering Department, University of Indonesia, Kampus Baru UI Depok, Indonesia*
[b]*Mechanical Engineering Department, University of Indonesia, Kampus Baru UI Depok, Indonesia*
**Corresponding Author: usman@che.ui.ac.id*

Indonesia imports BBM (Bahan Bakar Minyak) in a large scale. Furthermore, the usage of Bahan Bakar Minyak (BBM) in Indonesia is rising because of the growth of vehicle industry that around 5-6% each year. Because of that, the availability of BBM is decrease and the price is increase. If we can see from this problem, natural gas have a lot of potential to substitute BBM because Indonesia have a lot of natural gas which Indonesia is the 14th world rank in terms of natural gas reserves with reserves about 103,3 trillion cubic feet. The main problem from this natural gas is the storage and distribution process, because in normal condition natural gas is in gas phase so the storage capacity become small and not efficient. The technology that generally used for natural gas is Compressed Natural Gas (CNG) and Liquefied *Natural Gas (*LNG). However, this technology have low safety which, CNG needs high pressure about >3500 psi or 25000 kpa (250 bar) and LNG needs low temperature (-161oC) this condition is not safe and can harm people around it. To resolve this problem innovation is needed in terms of natural gas storage. Because of that in this experiment storage in cylinder tube with Adsorbed Natural Gas(ANG) technology is used. This technology make natural gas can be stored in low pressure around 500 psig (3447.37 kpa) and high storage capacity. Activated carbon that been used is Polyethylene Terephthalate plastic waste activated carbon because the great raw material availability and produce high surface area which is 1491,72m2/g. The ANG technology hasn't been used generally on vehicle even though this technology give more benefit than CNG. One of the factor is the adsorbent capability to adsorbed natural gas is still low and not stable compared to CNG technology on the same tank size. Therefore to predict the performance of ANG technology, modeling of ANG tank with Fluent Computational Fluid Dynamics (CFD) program is done so the condition inside the ANG tank can be known and can be used to increased the performance of ANG technology. Therefore, in this experiment natural gas storage test is done at the ANG tank model using Fluent CFD program. This experiment is begin with preparation tools and material by characterize the natural gas and activated carbon followed by create the mesh and model of ANG tank. The next process is state the characteristic of activated carbon and fluid in this experiment. The last process is run the simulation using the condition that already been stated which is at 27oC and 35 bar during 15 minutes. The result is at adsorption contour we can see that adsorption is higher at the top of the tank because the input of the adsorbent is at the top of the ANG tank so the adsorbate distribution is uneven that cause the adsorbate concentration at the top of the ANG tank is higher than the bottom tank.

Keywords: *Computational Fluid Dynamics Modelling; Activated Carbon; Adsorbed Natural Gas*

State of the Art of Joint Torque Sensor for Human Robot Interaction

Indrazno Siradjuddin, Rendi Pambudi Wicaksono, Anggit Murdani,

Zakiyah Amalia, Denda Dewatama

Malang State Polytechnic
Electrical Engineering Department
Mechanical Engineering Department
Malang,Indonesia
indrazno@polinema.ac.id

Obsevations from biological systems make an impression that robots should have the same level of abilities that are embedded in biological systems to perform safe andsuccessful interaction with human. The primary challenge in safe physical human robot interaction is to attach human like compliance behaviour into robots such that robot will not cause harm or injury to the human or robot themself under any operating conditions. For instance, a robot surgery should comply with the movement command from the surgeon, a manipulator robot should follow the operators hand movement during the learning process for pick and place application. This review discussion is focused on the technical innovation of compliant robot manipulators which have the most range of industrial applications. To achieve such human like behaviour, a robot manipulator should have some degrees of flexibility of its movement in order to respond given external forces or torques. This behaviour and characteristic can be controlled and developed by using active, passive and semi active compliant actuator devices, which will be functioned as robot joints. The key part of the compliant actuator technology is the torque sensor. Many torque sensor technologies have been proposed and developed for industrial application such as industrial machineries. However a comprehensive review of torque sensor which can be applied for compliant joint development cannot be found. The review is urgently needed for robotics advancing the development of compliant robot in the near future. Therefore, this paper provides a review of torque sensor over a two last decade. The review classifies the torque sensors by their sensing methods. Thus, the torque sensors sensing methods can be discussed in detail. This review also determines the possible application in the development of a compliant robot manipulator. In addition, the shortcomings and the advantages of the torque sensors existing are discussed. The future research direction and technology trend are identified.

Keywords:

Robot manipulator; Compliant joint; Torque sensor; Safe human robot interaction

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Application of Fenton-based Methods for the Treatment of Traditional Fabric Wastewater

Tuty Emilia Agustina[a,*], Gita Theodora Simanjuntak[a], Tessa Rebecca[a]

[a]Chemical Engineering Department, Jl. Palembang-Prabumulih Km 32, Inderalaya 30662, Indonesia
** Corresponding author.*
E-mail address: tuty_agustina@unsri.ac.id

Nowdays the textile industry in Indonesia have been growing, including in South Sumatra province which is rich in various kinds of traditional fabrics. In general, most of the textile industry used synthetic dyes in their manufacturing processes. The synthetic dyes were also often used in Palembang traditional fabric home industry. However, there was no doubt that the wastewater generated from these industries contain synthetic dyes which were toxic and harmful to environment. The synthetic dyes content in resulted wastewater from dying and washing processes contributes to the high value of COD as characterized in the textile wastewater. Therefore, it is a necessary to find an effective treatment to overcome the environmental pollution problem. On the other hand, Advanced Oxidation Processes (AOPs) offer a great potential methods to degrade the wastewater. AOPs are efficient methods to destroy organic pollutant not degradable by using biological process. AOPs are a set of processes comprising the production of hydroxyl radicals able to eliminate a wide range of organic substances, such as produced in textile wastewater. The objectives of this research were to study the application of various Fenton-based methods as one of AOPs method, for the treatment of traditional fabric wastewater. Photo Fenton (UV/Fenton), Fenton catalytic (Fenton/TiO_2), and photo Fenton catalytic (UV/Fenton/TiO_2) methods were utilized on Jumputan Cloth effluent, as one of textile home industry in Palembang, Indonesia. The effect of stirring time on COD degradation were also studied. In this study, a photo reactor equipped by a UV lamp which emitted light with a wavelength of 253.7 nm was operated in batch mode. TiO_2 was used as catalyst. Fenton reagent consist of Hydrogen Peroxide and Ferrous sulphate with a Fenton molar ratio of 80:1, pH of 3, TiO_2 concentration of 4 g/L, and the stirring speed of 400 rpm were applied. Experimental research showed that the longer the stirring time, the greater the reduction of COD. A maximum COD reduction was obtained by using the photo catalytic Fenton (UV/Fenton/TiO_2) method. The highest COD degradation of 94.06%, which is accomplished by stirring time of 120 minutes, was obtained.

Keywords:

Advanced Oxidation Processes (AOPs); Fenton-based Method; Photo Catalytic Fenton; Wastewater Treatment; COD Degradation

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Off Gas Purification of Crude Oil Refinery Using Activated Carbon from Coconut Shell Oil as Biosorbent

Yuliusman[a*], Nasruddin[b], Muhammad Khairul Afdhol[a], Rahmatika Alfia Amiliana[a], Afdhal Hanafi[a] and Imam Taufiq Ramadhan[a]

[a]*Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
[b]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
**Corresponding author: usman@che.ui.ac.id*

This research aim to remove impurities in off gas produced from oil refinery. Activated carbon is a material which can be used to remove those impurities by adsorption. This research expected to produce activated carbon that meets Indonesia National Standard (SNI) and applicable to waste treatment in oil refinery. This research done with 2 steps: 1) Making and characterization of activated carbon, carbonization done in temperature 400oC for 2 hours. After that, carbon with size 1-2 mm will be activated chemically with activating agent KOH (75% solution KOH) and (25% solution ZnCl2). A slurry mixture will be produced, then will be oven in temperature 100oC for 24 hours. The carbon will be activated after chemical activation and physical activation using N2 in 850oC for 1 hour. N2 is injected with flow rate 100 cc / minute. After 1 hour, physical activation continued with CO2 injection for 1 hour in temperature 850oC. 2) Adsorption impurities testing from off gas, is activated carbon tested isothermal adsorption in batch to the off gas system. Adsorption tests carried out on the prepared activated carbon from palm oil shell and commercial. Parameters tested in adsorption test are effect of adsorption condition and mass of activated carbon to the ability of adsorption. Activated carbon preparation results obtained are carbon from palm oil shell has carbon from 38%. Chemical activation with activating agent KOH and physical activation in 850oC resulting activated carbon with surface area specific of 1,295.2 m2/g, water content 13.6%, ash content 9.4%. Chemical activation with activating agent ZnCl2 and physical activation in 850oC resulting activated carbon with surface area specific of 743 m2/g, water content 14.5%, and ash content 9.0%. In the adsorption test of gas with 2.5 g of activated carbon were prepared from palm oil shell and a contact time of 60 minutes, maximum obtainable CO adsorbed is 47.67 x 104 ppm, CH4 is 24.54 x 104 ppm. Meanwhile adsorption process gas with 2.5 g of commercial activated carbon and contact time of 60 minutes maximum obtainable CO adsorbed is 46.96 x 104 ppm, CH4 is 24.59 x 104 ppm.

Keywords:

Activated Carbon; Biosorbent; Impurities Off Gas; Palm Oil Shell

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Drain Current Modeling of Gallium Nitride Schottky Barrier MOSFETs

Jeong-Hoon Seol, Sung-Ho Hahm*

School of Electronics Engineering, College of IT Engineering
Kyungpook National University
Daegu, 702-701, Korea
**shhahm@knu.ac.kr*

The drain current of the Schottky barrier (SB) MOSFET is modeled mathematically by considering both thermionic emissions and Schottky barrier tunneling from the source to the channel. The drain current is dependent on the Schottky barrier height, but is barely affected by the doping concentration. For the depletion type gallium nitride SB MOSFET with both an ITO source and drain electrodes, the threshold voltage is calculated to be 3.5 V, which is similar to the measured value of 3.75 V, and the calculated drain current is 1.2 times higher than the measured value.

Keywords:

Drain current, GaN, SB-MOSFET

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Synthesis of Partially Hydrogenated of Kemiri Sunan Biodiesel (*H-FAME*) Using NiMo/Carbon Catalyst to Increase Oxidation Stability of Biosolar

Elsa Ramayeni[a], Dimas Firlyansyah Pratama[b], Bambang Heru Susanto[a,b,*]

[a]*Elsa Ramayeni, Chemical Engineering Department, Faculty of Engineering,University of Indonesia, Depok 16424, Indonesia*

[b]*Dimas Firlyansyah Pratama, Chemical Engineering Department, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia*

** Corresponding author.*

E-mail address: bambanghs@che.ui.ac.id

Research, development and application of biodiesel as one of alternative energy has been more intensified. H-FAME is a biodiesel which has higher oxidation stability, so it can reduce the deposits that can damaged the diesel engine injection systems, pumping systems and storage tanks. By increasing the oxidation stability of biodiesel, it will improve the stability of Biosolar (one type of diesel engine fuel, the mixture of biodiesel and Solar), so the percentage of biodiesel in Biosolar will be higher. H-FAME synthesized by partial hydrogenation reaction of non-edible vegetable oils which uses Kemiri Sunan oil (*Reutealis Trisperma (Blanco) Airy Shaw*) under condition of <140 oC and <5 bar in stirred pressurized reactor. Kemiri Sunan oil have FFA (*Free Fatty Acid*) are low (<5%) so it can produce higher yields. To obtain desired H-FAME product, used catalyst that has high selectivity with hydrogenation reaction is important. One of suitable support catalysts are activated carbon. These catalysts has many advantages which are high crystallization, high surface area, and has very abundant availability in Indonesia. Active site which supported in this research is nickel molybdenum. The synthesis of metal nanocrystal was conducted by modification preparation from simple heating method which heating and cooling process run rapidly. This method can produce catalyst crystal with nano size, short time, and low energy. By using these catalysts, obtained high activity, selectivity, and stability. After catalysts activated, synthesis of H-FAME performed in hydrogenation reactor with two temperature at 110 oC and 120 oC, and also with two pressure at 4 bar and 6 bar, 800 rpm for 2.5 hours. The result of conversion was 87.99%, yield was 95.35%, and selectivity was 85.64 %.

Keywords:

Partially Hydrogenated; H-FAME; Kemiri Sunan Biodiesel; NiMo/Carbon Catalyst; Oxidation Stability; Biosolar

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Application of Modified Microwave Polyol Process Method on NiMo/C Nanoparticle Catalyst Synthesis for Hydrogenated Biodiesel Production

Dimas Farlyansyah Pratama[a], Bambang Heru Susanto[a*]

[a]Chemical Engineering Department, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia
** Corresponding author.*
E-mail address:bambanghs@che.ui.ac.id

The development of renewable feedstock-based diesel fuel is start to come up as the solution of national energy problem. However, the thermal and oxidation stability of biodiesel is not good enough. As a result, biodiesel can only be added to commercial diesel fuel as a mixture with concentration under 20%. To get better thermal and oxidation stability, partial hydrogenation process is applied to biodiesel caused the increase of monounsaturated FAME structure. Catalyst plays big role in partial hydrogenation reaction. Activated carbon supported NiMo nanocrystal catalyst are used in partial hydrogenation reaction to get high activity, conversion, and selectivity. Activated carbon, as a support, have high surface area and NiMo, as the active site, have good activity with hydrogen-involved reaction. In this research, NiMo/C catalyst are prepared by modified microwave polyol process method, which is provided a rapid heating and cooling process. The NiMo/C catalyst are prepared in various microwave power and heating time to get the optimum condition. This method can produce nano-sized NiMo/C catalyst with short time and low energy consumption. NiMo/C catalyst produced in this research has 263.21 m2/gram surface area and 31.77 nm crystal size. The NiMo/C catalyst is then used for Hydrogenated biodiesel production in hydrogenation reactor at 120 oC, 4 bar, and 800 rpm for 180 minutes. The result is hydrogenated biodiesel with 82.11% conversion and 85.32% selectivity.

Keywords:

Catalyst; NiMo Nanocrystal; Hydrogenated Biodiesel; Microwave Polyol Process; Partial Hydrogenation

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Defining Design Parameters for Housing Development in Tropical Climate Using Near Zero Energy House (NZEH) Concept

Yusuf Latief[1], Mohammed Ali Berawi[2], Ario Bintang Koesalamwardi[3],

Leni Sagita Riantini[4], Jade Sjafrecia Petroceany[5]

[1]Professor, Civil Engineering Department, Faculty Of Engineering, University Of Indonesia

[2,4]Lecturer, Civil Engineering Department, Faculty Of Engineering, University Of Indonesia

[3]Researcher, Civil Engineering Department, Faculty Of Engineering, University Of Indonesia

[5]Lecturer, Civil Engineering Department, Faculty Of Engineering, University Of Pancasila

In the effort of supporting renewable energy concept in housing development, one of the approaches is designing energy efficient housing. Issues such as cost efficiency and minimum environmental impact should be thoroughly considered when designing this type of housing. One of the concepts that was found to be cost-effective and increase the energy performance of a house is a near Zero Energy House (nZEH) concept. This concept enhance the use of natural resources, for example sunlight exposure, climate condition, and wind that could minimize the use of fossil fuel energy. Housing in the tropical climate and exposed to sunlight annually, such as in Indonesia, would be benefited by using nZEH concept. Moreover, there are specific design parameters that need to be determined in designing a nZEH housing. Therefore, the objective of this study is to clarify the identified design parameters for nZEH housing in tropical climate. Focus Group Discussion with practitioners and scholars was conducted to validate the identified design parameters of tropical climate nZEH. The results showed that building orientation, photovoltaic panel, fenestration, and passive design would be the basic parameters for nZEH housing in tropical climate.

Keywords:

Design Parameters, Energy, Near Zero Energy House, Tropical Climate

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A Garbage Collection Management Method for Reliable Non-Volatile Memory Systems

Chin-Hsien Wu, Ting-Wei Wang

Department of Electronic and Computer Engineering of National Taiwan University of Science and Technology
Taipei, Taiwan
chwu@mail.ntust.edu.tw, M10102127@mail.ntust.edu.tw

NAND flash memory is a popular non-volatile memory device and has been used for the data storage of mobile devices, Laptops, and various embedded systems. However, NAND flash memory requires a garbage collection mechanism due to its erase-before-write characteristic. Garbage collection consists of a series of activities (such as read, write, and erase operations) that usually degrade the lifetime and the performance of NAND-based storage systems. In this paper, we survey a garbage collection management method for reliable non-volatile memory (i.e., NAND flash memory) in embedded systems. Furthermore, we also propose the concept to cache a small part of appropriate information about garbage collection in RAM-limited embedded systems. We hope the concept can reduce the RAM space requirements and only cause a little increase in the amount of the original workloads such that the response time of the original workloads is not much affected.

Keywords:

NAND Flash Memory, Garbage Collection, Storage Systems, Embedded Systems

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Physicochemical Characteristics of Artificial Rice from Composite Flour: Modified Cassava Starch, *Canavalia ensiformis* and *Dioscorea esculenta*

Isti Pudjihastuti, Siswo Sumardiono, Noer Abyor Handayani

Chemical Engineering Department, Faculty of Engineering, Diponegoro University
Diponegoro University Campus, Tembalang, Semarang, Central Java, Indonesia

Indonesia is the third largest country on the global paddy rice production, however it is also considered as a rice importer. Even, Indonesia has the largest per capita consumption of paddy rice in the world with it consumes about 140 kilograms of paddy rice per person per year. Various attempts have been conducted by the Government to reduce imported rice rate. Product diversification using local commodities from Indonesia is one of appropriate solutions. Artificial rice, is a kind of product variety, might be developed as a new value product using different types of grains with or without added some nutrients and functionalities. Artificial rice was produced by hot extrusion method using composite flour original commodity from Indonesia (modified cassava starch, *Canavalian ensiformis*, and *Dioscorea esculenta*). Their high nutritions content are promising to use as food ingredients. The objectives of this study were to design and fabrication of hot extruder capacity 10 kg/day. Some formulations of artificial rice were also investigated in compare with commercial paddy rice. This study consists of three main stages, preparation of modified cassava starch, *Canavalian ensiformis*, and *Dioscorea esculenta'*s flour, formulation, and artificial rice production. Artificial rice has been successfully conducted using prototype of hot extruder with the temperature 95℃. Physical analyses (color, rehydration capacity and texture) were carried out to artificial rice product and commercial paddy rice. Texture analysis showed a lower value of hardness, cohesiveness, springiness and adhesion in compare with paddy rice. Chemical analyses (nutrition and amylose content) of product will be also presented in this study. The best formulation of artificial rice was achieved in 80% modified cassava starch, 10% *Canavalian ensiformis*, and 10% *Dioscorea esculenta*, respectively. In fact, the artificial rice is expected to be alternative products non paddy rice which could reduce people's reliance on rice and might be used as a staple food in Indonesia.

Keywords:

Artificial Rice, Modified Cassava Starch, Canavalian ensiformis, and Dioscorea esculenta

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Photo-Bio-Degradation of Phenol Using Composite TiO_2-pumice and Composite Biofilm *Acinetobacter baumanii*-Pumice

Agung Sri Hendarsa[a]*, Oktrianto[b], Heri Hermansyah[a]*, Slamet[a]*

[a]Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Depok, 16424, Indonesia
bDepartment of Chemical Engineering, Universitas Surya, Tangerang, 15810, Indonesia

The excess use of phenol compounds in the application at oil & gas industries and the inability to remove these compounds during wastewater treatment have resulted in the widespread occurrence of phenols in the natural environment. Phenols have been linked to serious risks to human and environmental health. Hence, the need to develop technologies that can effectively remove phenols from wastewater and source waters is a pressing challenge. In this study, TiO_2 was immobilized into pumice as photocatalyst to degrade phenol, and microorganisms were allowed to attach to the pumice surface to form biofilm as biocatalyst. In the synthesis of photocatalyst, treated pumice was coated by TiO_2 sol which from TiO_2 P25 as precursor using dip coating method. Then the pumice with biofilm were moved into the integrated photocatalytic biological reactor (IPBR) made of quartz glass, which was used for the degradation of phenol by three protocols: photocatalytic alone (P), biodegradation alone (B), and the two mechanisms operating simultaneously (photobiodegradation, P&B). Composite pumice with TiO_2 and composite pumice with biofilm *Acinetobacter baumanii* was used simultaneously to eliminate phenol in IPBR. Composite pumice with TiO_2 is characterized by FE-SEM/EDX and UV-Vis DRS. While the characterization of pumice-biofilm from *Acinetobacter baumanii* performed with SEM, TPC, Gram Staining and FTIR. The characterization results showed that the composite TiO_2-pumice and composite pumice with biofilm have been successfully synthesized. The experimental results indicated that phenol removal rate was quickest by B experiment. However, P&B experiment gave more complete mineralization of phenol than that by other protocols. During P&B experiment, the microorganisms grown on pumice carrier still kept the bioactivity degrading phenol, even under UV light irradiation. However, the dominant members of the bacterial community changed dramatically after the intimately coupled photobiodegradation in IPBR, according to Total Plate Count (TPC) analysis to the biofilm. Initial concentration of phenol used in these experiments were 10 ppm. The results of Photo-bio-degradation of phenol in IPBR are able to degrade phenol at 65 % during 210 minutes with a loading of 2,5% TiO_2 catalyst to pumice.

Keywords:

Phenol; Photocatalyst; TiO_2; Pumice; Biofilm; Acinetobacter baumanii; Composite; IPBR

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Formation of Carbide-Based Composite Anti-Corrosion Coating Layer Using Flame Thermal Spray Deposition

Teguh Endah Saraswati[a,*], Kartiko Nugroho[a], and Miftahul Anwar[b]

[a]*Department of Chemistry, Sebelas Maret University, Jl. Ir. Sutami 36 A Surakarta 57126 INDONESIA*
[b]*Department of Electrical Engineering, Sebelas Maret University, Jl. Ir. Sutami 36 A Surakarta 57126 INDONESIA*
** Corresponding author.*
E-mail address:teguh@mipa.uns.ac.id

Deposition of titanium carbide-based composite anti-corrosion coating material had been successfully performed by flame thermal spray method onto metal substrate using ball milled-nanopowder TiO_2 and carbon. Titanium carbide is one of the carbides materials which may have great potential due to its chemical and physical properties such as high melting and boiling point, high resistance to corrosion and oxidation, which widely used as a coating material for metal to enhance its performance and lifetime. In situ titanium carbide (TiC) coating layer could be produced in inert and high temperature environment by carbothermal reduction reaction via flame thermal spraying using mixed nanopowder of titanium dioxide and graphite powders. The preparation of nanopowder TiO_2/C was done by ball milling at the optimum time of 5 hours with a rotary frequency of 20 Hz (±1200 rpm). The milled nanopowder was then sprayed in flame thermal using butane gas and pushed by compressed air. Flame thermal spray coating process produced a coated metal substrate with a darker surface appearance and rougher texture. The contour of coated substrate was observed by optical microscope under 100X magnification showing the smoother contour due to the coating material particles was mostly successfully filled the stripped spaces on metal substrate. The material crystalline before and after treatment was analyzed by X-ray diffraction (XRD) pattern. The titanium carbide (TiC) peak intensity increased when the milled nanopowder used was added by polyvinyl chloride (PVC) binder. TiC typical peaks was existed at 2θ ~36º (202) and 41º (024). The surface morphology of coated metal substrate was also observed by scanning electron microscopy (SEM) under a 5000X magnification showing the various appearances of coating material depended on the weight ratio of initial material. The energy dispersive X-ray (EDX) mapping analysis shows that elements such as Ti, C, Fe and O existed in the coating material. The increasing of TiO_2 weight content decreased the corrosion rate, and increased the contact angle, while the increasing of carbon weight content decreased the hardness of coated substrate.

Keywords:

Carbide; Carbon; Titanium; Anti-Corrosion; Coating; Flame Thermal Spray

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Ultrasonic-Assisted Extraction of Total Phenolic Coumpounds from Ketapang Leaves (*Terminalia catappa)*

Denni Kartika Sari[a],Indar Kustiningsih[b],M Ridho Khorul Majid[c],Utami Triana Lusi[d]

[a,b,c,d]*Department of Chemical Engineering,University of Sultan Ageng Tirtayasa*
Jl. Jendral Sudirman Km 3Cilegon, Banten, 42435,Indonesia
** Corresponding author.*
E-mail address:author@university.xxx

The influences of ultrasonic-assisted extraction(UAE) conditions on phenolic compounds of Ketapang Leaves (*Terminalia catappa)* were investigated. The effects of , the extraction time and the ratio of ethanol: water to total phenolic content in the leaves of Ketapang (*Terminalia catappa*) were evaluated based on the total phenolic content(TPC). The result showed a significant variability of effect of time,and solven ratio on TPC. Extraction is done with ulltrasonic assisted extraction method using ethanol-water with the variation of solvent (50:50, 60:40, 70:30) in time (5 minutes, 10 minutes, 20 minutes and 40 minutes). Data measuring total phenolic content of the extracts of leaves of Ketapang (*Terminalia catappa*) the best results obtained at ethanol-water with the variation of 60:40 and 40 min of extraction time.

Keywords:

Ultrasonic Assisted Extraction, Total Phenolic Content, Ketapang Leaves

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Biodegradation of Methylcyclohexane (MCH) Using Composite Biofilm *Acinetobacter baumanii*-pumice Stone

Agung Sri Hendarsa[a]*, Oktrianto[b], Slamet[a]*, Heri Hermansyah[a]*

[a]*Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Depok, 16424, Indonesia*
[b]*Department of Chemical Engineering, Universitas Surya, Tangerang, 15810, Indonesia*

The petroleum industry and the use of its derived products contribute significantly to volatile hydrocarbon release. Emissions reduction has aroused international interest due to direct and indirect impacts on humans, plants and animals. Biological methods to eliminate hazardous products and to achieve odour control are an attractive alternative to phase transfer techniques such as activated carbon. Biofilm formed by bacterial activity of Acinetobacter sp. has been developed on pumice stone. The characterization of pumice-biofilm from *Acinetobacter baumanii* performed with SEM, TPC, Gram Staining and FTIR. The biofilm was characterized by scanning electron microscopy to find out the morphology of pumices surface. Total plate count (TPC) analysis was also conducted to investigate the cell density. Observation by scanning electron microscopy evidenced the present of abundant exopolymeric material surrounding the cells in the biofilm. The biofilm was tested to degrade methylcyclohexane (MCH), a pollutant from petroleum industry's waste. MCH recalcitrance was correlated with reduced levels of hydrocarbon - degrading bacteria and volatile hydrocarbon evaporation from the inoculum flasks. The degradation pathways, enzymes, and genes involved in the degradation of normal alkanes (n-alkanes) and aromatics have been investigated. Degradation of MCH were monitored during 210 minutes operation. We used MCH synthetic compounds with the initial concentration of 60 μmol/L (± 1500 ppm). Bacteria *Acinetobacter baumanii* biofilm can degrade 66.9% of 1500 ppm MCH. It can be concluded that biofilm from *Acinetobacter baumanii* can degrade phenol effectively.

Keywords:

Methylcyclohexane; Pumice; Biofilm; Acinetobacter baumanii; Composite

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Synthesis of Green Diesel Through Hydrolysis and Hydrodeoxygenation from Waste Cooking Palm Oil Using NiMo/Al2O3 Catalyst

Risya Utaviani Putri[a], Dimas Farlyansyah Pratama[a], Bambang Heru Susanto[a*]

[a]Chemical Engineering Department, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia
** Corresponding author.*
E-mail address:bambanghs@che.ui.ac.id

Green diesel is a second generation of biofuel that has a potential to answer the energy needs either in Indonesia or in the world. The specification of green diesel is similar with solar from crude oil. As the second generation, green diesel contains no oxygen that can damage the engine, unlike the first one. It also decreases the pollutant emission because of the lower carbon monoxide and hydrocarbon content. Hydrodeoxygenation process is used to remove the oxygen and produce green diesel which needs Al2O3 catalyst to increase the reaction rate. Hydrolysis process should be added to change triglycerides to free fatty acid in order to be used as hydrodeoxygenation feed. The raw material for this process is waste cooking palm oil which still has triglycerides form. The hydrolysis of waste cooking palm oil carried out under temperature 200oC and pressure of 1 bar for 7 hours with ratio of water and oil volume 60:40. Besides, hydrodeoxygenation is carried out with pressure of 12 bar and temperature of 375oC. The purpose of this research is to get highest yield and convertion, cetane index that is higher or equal to commercial fuel, and also low impurity content. The result of yield was 35.43%, conversion was 90.25%, selectivity was 45.63%, and cetane index was 60.45.

Keywords:

Green Diesel; Hydrodeoxygenation; Hydrolysis; NiMo/Al2O3; Waste Cooking Oil

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Trash as a Hub of Scavanger's Money

Mukti Andriyanto*

Housing and Urban Settlemet Master Degree Student, Departement of Architecture, University of Indonesia, Indonesia
** Corresponding author. E-mail address:author@university.xxx*

Living among trash and discarded, dirty materials, for some people is neither an option nor a choice. A scavenger either working by himself/herself or in relation with others, for some people is viewed with negativity in terms of quality living. However unwittingly, scavengers have taken on an important role in society in partially eliminating waste and discarded materials. In fact, they have become a small part of a big process of waste recycling in the recycling industry. Trash and discarded materials are obtained and collected in a collection center everyday to be weighed and exchanged for money from collectors. The similarity of cultural backgrounds and abilities, generally create the scavengers community who choose to live together in a certain ethnic community, which is always adjacent to the trash collectors and discarded materials. The presence of the figurehead of the collector has become a strong magnet for the culture of poverty. The lack of capacity of individual scavengers, who are not ready to survive in the competitiveness of big city is another contributing factor. Life in a group based on particular ethnic ties will indirectly strengthen the trust between individuals with communication abilities, which would be the social capital of the scavengers to survive. The dependence of the scavengers on the collector generally is a strong reason in choosing the location of their housing. So they seek to meet their needs for housing space independently, always on places adjacent to the collector, which are generally found on utilized land and built illegally. Life in groups that make up a particular ethnic community creates both individual spaces and communal spaces. Their presence on utilized land illegally means they have not been recognized administratively by the local government. So there are never any statistics encountered in relation to the exact number of those who inhabit certain parcels of land. Thus, through the case study "I Dwell in the [Im]Possibility of a Scavenger Community" in Kedoya, it is expected a scavenger dwelling concept will be among the findings that create individual and communal space.

Keywords:

Scavenger, Dwelling, Trash, Discarded, Dirty, Recycling, Collectors, Ethnic

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Effect of Different Substrates on Synthesis and Growth of ZnO Rods

Rina Dewi Mayasari, Aditya Eka Mulyono, Hanif Yuliani, Agustanhakri,

Masmui, and Ratno Nuryadi*

Center for Materials Technology, Agency for the Assessment and Application of Technology (BPPT), Puspiptek Building 224, South Tangerang, Banten 15314, Indonesia
** Corresponding author.*
E-mail address: ratno.nuryadi@bppt.go.id or ratnon@gmail.com

ZnO rods have been grown on different substrates, i.e. glass, Si, and Au substrates, to investigate the different effects on its materials properties. The growth process was started from using zinc acetate to fabricate seed layer by dip-coating process and then followed by growing the ZnO rods using zinc nitrate tetrahydrate by hydrothermal method at 95°C for 6 hour. In this process, the seed layer and ZnO rods are annealed at the temperature of about 350°C for 2 hour. ZnO rods were then characterized by X-Ray diffraction, scanning electron microscope, energy dispersive spectroscopy, and fourier transform infrared. The results show that ZnO rods were successfully grown homogenously and mostly in vertical direction with hexagonal structures. However, the diameter sizes of ZnO rods were significantly influenced by the kind of materials substrate. We found that ZnO rods on glass substrate have the smallest diameter size of about 193 nm. The average diameter sizes of ZnO rods on Au substrate are of about 317 nm whereas ZnO rods on Si substrate have the biggest diameter size of about 11 μm. Hence, the synthesis and growth parameters for the different substrates need to be optimized each other in order to grow ZnO nanostructures.

Keywords:

ZnO Nanorods, Glass Substrate, Au Substrate , Si Substrate, Hydrothermal, Dip-Coating

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Influence of the Zeta Potential on the Dispersability of Carbon Nanotube

Desi Heltina[1,a], Praswasti PDK Wulan [2,b], Slamet [3,c]

[1,2,3,]Department of Chemical Engineering, Faculty of Engineering
Universitas Indonesia, Kampus UI Depok16424, Indonesia
[a].desiheltina@yahoo.co.id, [b] wulan@che.ui.ac.id, [c] slamet@che.ui.ac.id

Carbon nanotubes (CNT) have large surface area and pore structure is accommodated by the nano sized carbon material that makes it be very effective and efficiently used as an adsorbent material. To improve dispersability it is necessary to modify CNT to improve dispersability it is necessary to modify or treatment of the CNT. Modifications of CNT can be done with the addition of chemical compounds, such as compounds of acids and surfactants. The purpose of this research was to study the effect of the addition of surfactant on the CNT treated with the method of sonication on the addition of surfactant. The SEM, EDX , XRD and FT-IR and zeta potential were used to characterize the carbon nanotube.

Keywords:

Carbon Nanotube (CNT), Surfactant, Dispersability

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Impact of Dopant-Atoms in Inter-Band Tunneling in Si Nanoscale Tunnel Diodes

D. Moraru[1*], G. Prabhudesai[1,2], M. Shibuya[1], and M. Tabe[1]

[1]*Research Institute of Electronics, Shizuoka University, Japan*
[2]*Graduate School of Science and Technology, Shizuoka University, Japan*
** Corresponding author.*
E-mail address:moraru.daniel@shizuoka.ac.jp

Si *pn* diodes have been a fundamental building block of electronic circuits for several decades. Continuous device downscaling brings these devices into the nanoscale regime, where new properties and new functionalities can emerge. At this stage, it becomes most crucial and timely to evaluate the possibilities of operation of *pn* diodes at the most fundamental levels, which in this case means at the level of discrete dopant-atoms. In recent years, we have shown that *pn* diodes with moderate to high doping concentrations exhibit effects due to the discrete dopant-atoms present in the depletion region. Such dopants mostly work as traps for carriers, with trapping and detrapping events being detected by the diode current. This dynamic behavior can be enhanced when we consider that the dopant energy levels may become deeper under the effect of dielectric and quantum confinement. These results are important demonstrations of the impact of dopant atoms on the regular diode transport. In this work, we will outline the role of dopant-atoms in *pn* diodes with much higher doping concentrations. In such devices, inter-band tunneling becomes a key transport mechanism, due to the degenerate-level doping and the extremely narrow depletion region width. Under these conditions, the dopants located in the depletion region can significantly affect the inter-band tunneling current. This contribution is critical because inter-band tunneling in Si must usually occur with the assistance of phonons to conserve the momentum in tunneling between conduction band and valence band, due to the indirect bandgap nature of Si. However, such a condition may be overcome by a suitable role of the dopant-atoms. Here, we will discuss a few different categories of effects contributing to inter-band tunneling: (i) dopant-atoms working as traps; (ii) dopant-atoms working as stepping-stones in inter-band tunneling; (iii) donor-acceptor pairs; (iv) a few-dopant molecules. We show that inter-band tunneling can be modulated distinctly and significantly by these different effects. Finally, we demonstrate a pathway for implementing these atomic-level effects in the design of highly-efficient nanoscale-Si tunnel diodes.

Keywords:

Dopant-Atoms; Single-Electron Trap; Inter-Band Tunneling; Si Nano-Diode; Donor-Acceptor Pair

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Effect of Ratio Compotition and Particle Size to Pellet Performance - Pelletizing Combination of MSW and Biomass Feedstocks

Adi Surjosatyo, Cindy Rianti Priadi, Apri Wiyono, Titi Puspita Sari Ika Pratiwi

Department of Mechanical Engineering, University of Indonesia, 16424 Depok, Indonesia

Total increase in municipal waste generation in Indonesia has reached 175,000 tons / day. Where the largest percentage of waste derived from organic waste components with a percentage up to 60%. The potential of organic waste can be used as raw material for the biomass mix of emission reduction efforts on the conversion of fuel from waste energy. In this research, pure raw materials used leaves (Acacia mangium), wood (Acacia mangium), junk food and shells of coconut (Cocos nucifera L.) and a combination of any kind of pure raw materials with the composition ratio of 75:25, 50:50 and 25:75. 5 results which were obtained by screening the best calorific value analysis, then do pelletization / densification is pure materials wood and coconut shells and 3 combination composition of wood and coconut shells. Screening 5 best variations tested physical parameter, namely density and durability with the dependent variable diameter of 6.5 mm dies and pellet pressing pressure of 50 MPa. The purpose of this study to analyze the effect of the ratio of the composition and particle size on the pelletization MSW - coconut shell against calorific value, density and durability of pellets produced. The results showed that the calorific value was biggest with the combination of wood - coconut shell, where the higher the composition of the wood, the higher durabilitynya. Where the value obtained wood durability by 92% and density of 1.7 g / cm3. In addition, the larger the particle size, the lower raw material durabilitynya and the lower the density.

Keywords:

MSW, Biomassa, Pellet, Durability, Bulk Density

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Liquefaction of Waste Plastics as a New Method for Fuel Production and Its Upgrading over Volcanic Ash

Dieni Mansur[a], Muhammad Arifuddin Fitriady[a], Sabar Pangihutan Simanungkalit[a]

[a]Research Center for Chemistry, Indonesian Institute of Sciences,
Kawasan Puspiptek Serpong, Tangerang Selatan 15314, Indonesia
** Corresponding author.*
E-mail address: dienilipi@gmail.com

Plastics are a group of synthetic or natural materials and composed of high-molecular chains with the major element is carbon or in part of combinations of carbon with oxygen, hydrogen, nitrogen, and other organic or inorganic elements which solid in the finished state. Plastics capable of being formed into various shape for several applications in field of food packaging, agricultures, households, automobiles, toys, electronics, and so on. Therefore, demand for plastics has increased every year. The increase in plastics use correspondingly increases the amount of waste plastics being produced. Waste plastics consisted of polyethylene (PE), poly(ethylene terephthalate) (PET), polypropylene (PP), polystyrene (PS), and poly(vinyl chloride) (PVC). Hydrocracking, thermochemical, and catalytic conversion of waste plastics were widely studied by several researchers to produce liquid fuel. Among them, thermochemical conversion such as pyrolysis is mainly used. Pyrolysis process produces three kinds of products: gas, crude oil, and solid residue. Then, the crude oil was upgraded over silica-alumina or zeolite catalysts. In this research, we developed a new method to convert polyethylene type of plastic into liquid fuel by liquefaction process with no solvent under medium conditions. The liquefaction process was carried out in an autoclave in a range of temperature of 200-350 °C and pressure of 1-13 kg/cm^2. Liquefaction process at 200 °C was produced a solid product. Liquid (crude oil) product was recovered after liquefaction at 250 °C, however, the crude oil consisted of two layers that bottom layer was more concentrated than upper layer. A homogenous crude oil was recovered at 300 - 350 °C of liquefaction for 0 - 60 min. During liquefaction over 250 - 350 °C, solid residue was negligible. The products of liquefaction consisted of crude oil and gas with as high as 100 % conversion was achieved. In upgrading process of the crude oil, activity of volcanic ash as a catalyst was investigated and found that it was potential to increase the yield and quality of the crude oil. Maximum yield of crude oil was 87% and obtained at 350 °C and 9 kg/cm^2 for 30 min reaction time.

Keywords:

Liquefaction; Waste Plastics; Polyethylene; Crude Oil; Upgrading; Volcanic Ash; Liquid Fuels

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The Development and Analysis of a Decision Systems for Student Tuition Fee at Malang State Polytechnic Using Multi-Objective Optimization by Ratio Analysis (MOORA) Method

Rudy Ariyanto[*a], Erfan Rohadi[b], Rosa Andrie Asmara[c], Imam Fahrur Rozi[d], Nugroho Suharto[e]

[a,b,c,d]*Department of Information Technology, The State Polytechnic of Malang, Jl. Soekarno Hatta No. 9, Malang 65141, Indonesia*

[e]*Department of Electronics Engineering, The State Polytechnic of Malang, Jl. Soekarno Hatta No. 9, Malang 65141, Indonesia*

This Policy for student tuition fee for higher degree institutions has been changed since year 2015. This policy is stated in Ministerial Decree of research, technology and higher education of Indonesia Republic No. 22 year 2015 (Permeristekdikti). The main objective of this decree is for broadening access to society to pursue their degree in higher degree institutions, focusing for those who have economical limitations. Student tuition fee regulation as stated in the decree is named student single tuition fee policy (Indonesian: UKT, Uang Kuliah Tunggal). In UKT scheme, the regulated student tuition fee will cover all cost components, such as: fee for courses, laboratory, exams and graduations. In contrast, in previous years before the decree of Ministry of research, technology and higher education of Indonesia Republic No. 22 year 2015 was implemented, the tuition fees were varying significantly between one and the other institution of higher education. In present, by the decree No. 22 year 2015, the tuition fees nominal is varying between categorized student. The student categorization is based on the student or the family income. This means that the student who has more capable financially will support to those who has less financial support, in some extent, to support the total operational costs of the higher education institution. Indeed, the Indonesian government involvement is financially needed to support the operational costs such that the regulated tuition fee is equitable concerning the local economic situation. The main issue for the implementation of the decree No. 22 year 2015 is to have a proper reasoning for the institution to decide the categorization scheme. The policy made has to be justified and reasonable. In addition to the current problem, the prospectus students come from so many different backgrounds: economically and demographically. This work proposes a decision support system that can filter and classify students based on variables that describe economic capability. The Multi-Objective Optimization by Ratio Analysis (MOORA) method is used to filter and classify the prospectus student data. The detail MOORA implementation and Web application development are presented in this work. The proposed application has been examined and presented to the institution committee board. The results can be used to decision support for tuition fees policy applied in the State Polytechnic of Malang.

Keywords:

UKT, MOORA, Decision Support System

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Polyvinyl Alcohol (PVA) Partially Hyrolyzed Addition in Synthesis of Natural Hydrogel Carboxymethyl Cellulose (CMC) Based from Water Hyancinth

Asep Handaya Saputra[a], Nadia Huda Apriliana[b]

[a]*Department of Chemical Engineering, Faculty of Engineering Universitas Indonesia Depok 16424, Indonesia*
Email : sasep@che.ui.ac.id
[b]*Department of Chemical Engineering, Faculty of Engineering Universitas Indonesia Depok 16424, Indonesia*
Email : nadia.huda@ui.ac.id

The utilization of the cellulose from water hyacinth could increase the added value of water hyacinth. This cellulose can be utilized as a polymer product for making the hydrogel. This polymer can be superabsorbent material which has absorbent ability up to 200 times of weight of hydrogel itself. Hydrogel can be produced from Carboxymethyl Cellulose (CMC) by using cellulose. In order to increase the absorbent capacity, the addition of a certain type of polymer is needed. In this study the type of polymer that will be added is Polyvinyl Alcohol (PVA) partially hydrolyzed type with variation of PVA partially hydrolyzed/CMC composition used are 20:80, 80:20, 50:50, 25:75 and 75:25. Citric acid 10% is used as chemical crosslinker agent. The purpose of this variation is to get optimal composition by considering the characteristic of hydrogel (swelling ratio, functional group and morphology structure). So the addition of PVA partially hydrolyzed in synthesis hydrogel is expected to get hydrogel with better characteristics.

Keywords:

Hydrogel; Water Hyancinth; Cellulose; Carboxymethyl Cellulose (CMC); Polyvinyl Alcohol (PVA) Partially Hydrolyzed; swelling ratio

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LiFi as an Emerging Technology to be Utilized in Indonesia

Lesti Setianingrum, Sasono Rahardjo

Centre of Technology for Electronics
Agency of The Assessment and Application of Technology (BPPT)
Jakarta, Indonesia lesti.
setianingrum@bppt.go.id
sasono.r@bppt.go.id

The needs of internet connection for supporting internet connectivity and social media access become much more important. Many places, nowadays, are connected with Wireless Fidelity (WiFi) services to answer these needs. The WiFi which uses radio waves has limitation on capacity spectrum and bandwidth. So that, it may cause trouble related to spectrum crunch and over bandwidth. Meanwhile, recently Light Fidelity (LiFi) technology has been developed in some countries, where data is transmitted via LED's light while it is illuminating. LiFi becomes an emerging technology to answer bandwidth problem in the near future where telecommunication are expected grow highly. Since, LiFi provides the possibility of the real wireless broadband services. Furthermore, it gives no harmful effect to human body, since light spectrum has no electromagnetic interference. This paper shows literature study of the possibility of LiFi technology application for Indonesia. This technology will be one of the best solution to balance telecommunication technologies available to get maximum access, secure transmission and much wider bandwidth for the coming 5G technology demands.

Keywords:

Light Fidelity (LiFi); Telecommunication; Spectrum Crunch; Wireless Broadband; 5G Technology

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ENCAPSULATION OF MANGOSTEEN EXTRACT IN VIRGIN COCONUT OIL BASED NANOEMULSIONS: PREPARATION AND CHARACTERIZATION FOR TOPICAL FORMULATION

Kamarza Mulia, Elsa Krisanti, Gitasha A. Putri

Chemical Engineering Department, Faculty of Engineering
Universitas Indonesia, Depok, 16424, Indonesia
E-mail: kmulia@che.ui.ac.id

Hydrogel of a nanoemulsion system containing extract of mangosteen rind was developed and characterized as a topical formulation. Mangosteen (*Garcinia mangostana* L.) is a tropical fruit that has been used in traditional medicine due the significant amount of xanthones present in its rind. Mangostins, as members of xanthones, have been known to have diverse biological properties such as antifungal, antibacterial, antioxidant, antiviral and antitumor activities. The encapsulation of mangosteen extract in nanoemulsion is considered a promising strategy to utilize this bioactive compound as a topical formulation. In this study, a high-speed homogenization method was used to produce nanoemulsion of virgin coconut oil (VCO) as the oil phase, combined Tween 80 and Span 80 as the oil-in-water surfactant, and distilled water used as the aqueous phase. The homogenizer speed, oil and surfactant composition, and hydrophilic lipophilic balance (HLB) values of the surfactants were varied in order to get a stable nanoemulsion formulation. The most stable nanoemulsion was obtained using oil to surfactant mass ratio of 1:1.4, surfactant HLB value of 12, and a homogenizer speed of 8000 rpm. Nanoemulsion formulation with droplet size of 181 nm, zeta potential of -30.9 mV, and 0.01% α-mangostin loading was stable for 28 days without phase separation. Based on the accelerated stability test, the nanoemulsion shelf life is estimated to reach one year. The present study revealed that the VCO-based nanoemulsion is a promising carrier of mangosteen extract for topical formulation.

Keywords:

α-Mangostin; Mangosteen; Nanoemulsion; Virgin Coconut Oil

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Water Recycling Opportunity in the Business Sector in Greater Jakarta Region, Indonesia

Cindy R. Priadi[a], Evelyn Suleeman[b], Linda Darmajanti[b], Shanty Novriaty[b], Nyoman Suwartha[a], Rina Resnawati[a], Gita L. Putri[a], Elzavira Felaza[a], Tri Tjahjono[a]

[a]Department of Civil Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia

[b]Department of Sociology, Faculty of Social and Political Sciences, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia

This study is aimed to compile best practice for water recycling by the early adopters from business sector to identify enablers, barriers, and opportunity of water recycling implementation. It was conducted through semi-structured interviews, desk review, and observations. Also conducted in Jababeka Industrial Estate (Jababeka) a comparison study between raw water and treated wastewater quality. Best practice study of eight business sectors in Jakarta showed that their main purpose of water recycling is cost-saving on water bills. Most of them used recycled water in areas with minimum direct contact possibilities with people to reduce risk from social barriers. The absence of clear legal framework also identified as a reason behind the reluctance of further water recycling implementation. However, this barrier can also be an enabler. With the decreasing of raw water quality in Greater Jakarta Region, water recycling still presents great opportunity to be implemented. One example is Jababeka which raw water and treated wastewater quality based on comparison in parameter pH, BOD, COD, TSS, and fecal coliform, showed no significant differences. Considering the enablers, barriers, and water quality comparison, wastewater recycling has great opportunity to be further applied and supported by related stakeholder.

Keywords:

Best Practice; Water Recycling; Statistical T-Test; Water Quality

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Optimization of CaO + H_2O Reaction, Cooling Bath NaCl/Ice and Sodium Thiosulfate Clock Reaction in the Prototype of Chem-E-Car SMARTTRONS

Dhoni Hartanto[a*], Waliyuddin Sammadikun[a], Akhmad Sutrisno[a], Abdul Basit[a], Ade Surya Siladryanto[a]

[a]*Chemical Engineering Department, Engineering Faculty, Universitas Negeri Semarang, Semarang, Indonesia, 50229*
[b]*Automotive Engineering Education Departement, Engineering Faculty, Universitas Negeri Semarang, Indonesia, 50229*
[c]*Electrical Engineering Education Department, Engineering Faculty, Universitas Negeri Semarang, Indonesia, 50229*
** Corresponding author.*
E-mail address: dhoni.hartanto@mail.unnes.ac.id

Chem-E-Car is an annual competition that is held by student majoring in chemical engineering. According to Chem-E-Car rules, team must design small scale automobiles that operate by chemical means. The challenge is to have the car stopped as close as to the designated finish line and to be able to hit the golf ball toward to the goal post to make a score while carrying the specified load. Chemical reaction is the only way to power and stop the car. Prototype Chem-E-Car Smarttrons uses CaO, H_2O, NaCl, HCl, and $Na_2S_2O_3$ for chemical reaction. Smarttrons power source obtained from thermoelectric which generate electricity from the temperature gradient. Reaction of $CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2(s)}$ with ΔH of -63.71 kJ as a hot side and cooling bath of NaCl/Ice as a cold side were used as a power source reaction. The temperature obtained from this reaction were 89.6^{o}C and -12.3^{o}C for a hot and a cold side, respectively yielding the temperature gradient of + 101.9^{o}C. The heat flux produced then converted into electricity using 8 thermoelectric generators which generated the voltage of 17.5V. This voltage then used as a power to the motor and Arduino microcontroller. The furthest distance and time travelled were 19.2 m and 3 minutes 10 second, respectively using 336 g of CaO, 100 mL of H_2O, 200 g of NaCl, and 600 g of ice. The sodium thiosulfate clock reaction serves as the timed chemical process that stops the car after the reaction has finished. Sodium thiosulfate clock reaction is a reaction between $Na_2S_2O_3$ and HCl to form NaCl, SO_2, S, and H_2O. The reaction reaches completion when there is a change in colour from clear to opaque white. The colour change of the sodium thiosulfate clock solution results in a change in the LDR value. The sensor yields a value same as the reference value of 110 and an analogue output signal is sent to stop the DC motor and rotate a servo motor to hit golf ball. The duration of the sodium thiosulfate clock reaction is dependent on the molarity/amount of sodium thiosulfate used in the reaction where the concentration of HCl is fixed at 1 M. Sodium thiosulfate clock reaction gives mathematic models by $y = 0{,}658x^{-1{,}79}$ with $R^2 = 0{,}9563$. This mathematic models can be used to predict the molarity of sodium thiosulfate in the spesific distance.

Keywords:

Chem-E-Car, CaO, H_2O, Cooling Bath, Thermoelectric Generator, Sodium Thiosulfate, Clock Reaction

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Green Diesel Production from Palm Oil Using Klaten's Natural Zeolite Modified with Fe Metal Nanoparticle as Heterogeneous Catalyst

Witri Wahyu Lestari[a,*] , Riandy Putra[a], Bambang Heru Susanto[b], Fajar Rakhman Wibowo[a]

[a]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Sebelas Maret University, Jl. Ir Sutami No.36A, Kentingan-Jebres, Surakarta Central Java 57126, Indonesia, Fax: +62 271 663375; Tel: +62 271 663375, email :
[b]Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru Universitas Indonesia, Depok 16424, Indonesia
** Corresponding author.*
E-mail address: witri@mipa.uns.ac.id, witri@mipa.uns.ac.id

Petroleum-based fossil fuel is still the primary source of energy consumption in Indonesia. Considering that almost all of automotive for the transportation sector utilize of this un-renewable fuel cause the depletion of fossil-fuel. An alternative renewable fuel for solving this problem is the production of bio-hydrocarbon from biomass, so-called green diesel. Chemically, green diesel has the similar structure to petroleum-diesel properties that can be produced through the hydrodeoxygenation of vegetable oil. In the present work, green diesel produced from palm oil was performed in a semi-batch stirred autoclave reactor over natural zeolite-supported Fe nanoparticle as a heterogeneous catalyst. In this research, natural zeolite from Klaten's, Central Java was activated using hydrochloric acid 6 N and continued by cation exchange using NH_4Cl 1 N. These treatments successfully increased Si/Al ratio from 4.72 to 7.82 according to XRF analysis. This result indicated that some dealumination process which is lead to the pure mordenite phase occurred. The dealuminated natural zeolite was characterized by XRD analysis supported with refinement process, TO_4 site (T = Si or Al) by FTIR and morphological analysis by SEM-EDX. The result showed that the structure of dealuminated natural zeolite remains stable, cleaner and promising for catalytic properties. Compared with the simulated powder pattern, the dealumination of natural zeolite lead to a purer mordenite phase. Based on FTIR data, OH stretching band from silanol groups was observed at 3440-3650 cm^{-1} and an asymmetric stretching band of the tetrahedral atoms is shifting to the higher wavenumber from 1047.39 cm^{-1} to 1065.72 cm^{-1} due to the dealumination process. Morphological analysis using SEM showed that activated zeolite still occupy irregular shape but much cleaner. Modification of Klaten natural zeolite with Fe (1, 3, 5, 10 wt.%) was prepared by the incipient wetness impregnation method by using $Fe(NO_3)_3.9H_2O$ as a precursor. The presence of Fe metal nanoparticles on the surface and pore of activated and natural zeolite have no significant influence on the crystall structure, according to XRD analysis. The occupancy of Brønsted acid site of the sample was observed by FTIR analysis. The obtained materials were tested for the conversion of palm oil into diesel-range hydrocarbons (C_{12}-C_{18}) under conditions of 375 °C, 12 bar H_2, 550 rpm for 2 h. By combining gas-phase and liquid product analyses, decarboxylation and/or decarbonylation was a dominant reaction pathway when the Fe supported on activated natural zeolite (Fe/ANZ) catalyst was employed. The most abundant composition in the liquid hydrocarbon products was straight chain n-C_{15} and n-C_{17} alkanes as observed by GC-MS analysis. The liquid yield product exhibited a higher conversion into diesel-like hydrocarbons reached more than 45% when the Fe/ANZ (10 wt.%) catalyst was used. This study has shown that a series of Fe/ANZ catalyst remains to be highly active and favorable for contributing in the conversion of palm oil into green diesel at a high temperature.

Keywords:

Klaten's Natural Zeolite; Modification; Iron Nanoparticles; Hydrodeoxygenation; Palm Oil; Green Diesel

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Urban Bee Concept

Muhamad Sahlan[a,b]*, Nelson Saksono[a,b], Jeffry Lesmana[b], Khoziq[b], Yogie[b], and Andre[b]

[a]Chemical Engineering Departement, Faculty of Engineering, Universitas Indonesia, Depok, Indonesia
[b]ThreeBee Community, Bogor and Depok, Indonesia
**Corresponding Author : Muhamad Sahlan, Email : muhamad.sahlan@gmail.com*

The apitherapy principle said that the best honey for people is the honey that produced by bee that stay around them. This philosophy push us, as the community that stay in urban area, to find out honey bees species that could be farmed in urban area. Trigona is stingless bee that could produce honey and adapted in urban area. As the showroom for this concept, we made Stingless bee farm in City Forest that is Universitas Indonesia Campus Forest (green area). About 5 species of Trigona Species could adapt and stay in the city forest, about 250 colonies also could life and produced honey and propolis. We also studied the bee food around farm area. The area rich nectar (for honey) and resin (for propolis), however the pollen was limited. We found that wild spinach is pollen rich plant and the bees like to eat the pollen. Based on those reasons, to enrich pollen source, we planted wild spinach around the colonies. The results showed that first, Stingless bee is the best honey bees for urban area. Second, urban bee also need bee food characterization. Three, wild spinach is the ideal pollen food for the stingless bee. Beside as honey producer, the area is also could act as eco-tourism place, as conservation place for the stingless bees and also for research. Urban bee concept have a good impact for urban community.

Keywords:

Urban, Bee, Stingless, Food, Farm

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Modeling of a Fixed-Bed Reactor Integrated with Distillation Columns for Methanol Dehydration to Produce Dimethyl Ether

Yuswan Muharam[a*], Lisa Marie Zulkarnain[a] and Nurania Saubryani[a]

[a]Department of Chemical Engineering, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia
** Corresponding author.*
E-mail address:author@university.xxx

The research aims to obtain the mathematical model of a heterogeneous fixed-bed reactor integrated with distillation columns to produce dimethyl ether from methanol. A recycle stream was incorporated to increase dimethyl ether yield. The phenomenological model of the reactor was developed considering interstitial and internal mass transfers, but to decrease the calculation time, a shortcut model of distillation columns was utilized. Likewise, for the same reason, the reactor was considered to be isothermal. The operating conditions and parameters give the most dimethyl ether produced in the simulation environment of the recent study are the reactor length of 4 meters, the reactor inlet pressure of 18 atm, the reactor inlet temperature of 533 K, the reactor inlet velocity of 0.408 m/s, and the distillation pressure of 8 atm. Under these conditions and parameters, 10.7 moles/s of dimethyl ether is produced, with the total yield of 47% and the methanol conversion of 90%. The addition of recycle stream increases the yield by 2%.

Keywords:

Dimethyl Ether; Methanol; Fixed-Bed Reactor; Distillation Column; Recycle

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Application of Computational Fluid Dynamic for Non-geometric Scale-up of Stirrer Batch Reactor for Crude Palm Oil Degumming Process

Yuswan Muharam[a]* and Aditya Kurniawan

[a]Department of Chemical Engineering, Faculty of Engineering, University of Indonesia, Depok 16424, Indonesia
** Corresponding author.*
E-mail address:muharam@che.ui.ac.id

In this research, computational fluid dynamics is applied to assist scale-up of crude palm oil degumming process which involves immiscible liquid-liquid mixing and controlled by mass transfer. Experiment result of 100 ml laboratory scale reactor is uses as basis to designing 1.25 m^3 large scale stirrer batch reactor. Geometrical similarity cannot be maintained while scale-up. Three impeller configurations are proposed for large scale reactor. Mass transfer coefficient times interfacial area ($k_c a$) is used as similarity criteria. Mass transfer coefficient is obtained from laboratory experiment and correlated to droplet Reynolds number. While interfacial area is derived from liquid-liquid mixing simulation result by applying mixture model for the multiphase flow modeling. By applying this scale-up method, rotational speed for large scale reactor is obtained that will give similar mass transfer rate with laboratory scale reactor and therefore its conversion.

Keywords:

CFD, Non-Geometric, Scale-Up, Mixture Model, Degumming

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Electrochemical Impedance Spectroscopy Characterization of Passive Film of Stainless Steels

Sri Hastuty[a,*], Hideki Katayama[b], Eiji Tada[c], Atsushi Nishikata[c]

[a]*Department of Mechanical Engineering, Pertamina University. Teuku Nyak Arief Road, Simprug, Jakarta. 12220*
[b]*Corrosion Analysis Group, Materials Reliability Unit, Environment and Energy Materials Division, National Institute for Materials Science (NIMS). 1-2-1 Sengen, Tsukuba-shi, Ibaraki 305-0047 Japan*
[c]*Department of Chemistry and Materials Science, Tokyo Institute of Technology. 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8550, Japan*
** Corresponding author.*
E-mail addres: sri.hastuty[at]gmail.com, sri.hastuty[at]universitaspertamina.ac.id

Corrosion resistance of stainless steels depends upon the surface state, that formed by different kinds of surface treatments, such as passivation in nitric acid. The primary aim of the surface treatments is to enhance the protective passive film by changing its composition, structure and thickness, and/or by reducing weak points, for example MnS inclusions. This study will investigate the effect of several kinds of electrochemical treatments on the corrosion resistance and passive film behavior by Electrochemical Impedance Spectroscopy. The surface treatment was carried out in an aerated 5 M nitric acid (HNO_3) solution by three different methods; immersion, potentiostatic polarization and potential cycling. The typical Nyquist plots measured in 0.1 M $Na_2B_4O_7$ at 25^{o}C and 50^{o}C. 1. All the samples revealed only one time constant of an unfinished semi-circle arc. The increase in semi-circle is associated with increase in Polarization Resistance ($R_{p)}$ and the R_p values are strongly dependent on the passive film characteristic and are a measure of corrosion resistance of the materials. R_p values are increase from as polished surface, followed by immersion and then potentiostatic, and potential cycling. Higher R_p implies more protective and homogeneous passive film. The effect of passivation becomes greater by increasing the temperature of nitric acid solution from 25 to 50^{o}C that is shown by higher R_p.

Keywords:

Ferritic Stainless Steels; Passive Film, MnS Inclusions; Nitric Acid; Electrochemical Impedance Spectroscopy

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Structural Properties of Lithium Titanium Oxides Synthesized from LiOH and TiO_2 by Solid State Process

Sri Harjanto*, Dede R. Kurnia, Jaka Fajar and Bambang Priyono

[a]Department of Metallurgical and Materials Engineering, Faculty of Engineering, Universitas Indonesia, Kampus UI Baru, Depok 16424, Indonesia
** Corresponding author.*
E-mail address:author@university.xxx

Combination of high energy mechanochemical and sintering process were conducted to synthesize lithium titanium oxides ($Li_4Ti_5O_{12}$ or LTO) from LIOH and TiO_2. TiO_2 anatase and rutile was used as raw materials in the process. LiOH and TiO_2 was mixed with the ratio of 4:5. High energy mechnochemical process was employed by means of vibrating high speed mill with revolution speed of 2000 rpm for 30, 60 and 90 minutes. Then, the milled powders were applied two stages sintering process at temperature of 480ºC for 30 minutes and 800ºC for 240 minutes. The results showed that $Li_4Ti_5O_{12}$ from rutile and anatase were formed by using this process. However, excess TiO_2 and Li_2TiO_3 were still observed in the sinter products from either rutile or anatase mixtures. Prolonged mechanochemical process tend to improve the homogeneity of LTO products.

Keywords:

Rutile; Anatase; Lithium Hydroxide; Pseudo LTO; Mechanochemical; Two-Stages Sintering

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Synthesis of Biodiesel from CPO by Using Contact Glow Discharge Electrolysis

Nelson Saksono[1,a], Danar Aditya Siswosoebrotho[1], Jeremia J. C. Pranata[1], and Setijo Bismo[1]

[1]Departemen Teknik Kimia, Universitas Indonesia, Depok 16424, Indonesia
Telepon: +62217863516, Fax: +62217863515.
[a)] Corresponding author: nelsonsaksono@gmail.com

This research has evaluated the use of Contact Glow Discharge Electrolysis method in the synthesis of biodiesel. The purpose of this research is to get the synthesis process and biodiesel product. The solution used is the mix of CPO and methanol with molar ratio of 1:24, and catalyst of NaOH and KOH with variation of concentration 0.5% - 1.5%-wt. The result shows that the biodiesel can be made from transesterification reaction that may be initiated by radical methoxide. The use of electrolyte KOH is better than NaOH based on the yield of biodiesel and the energy consumption. The optimum yield reaches 97%, at the synthesis for 30 minutes with the use of KOH 1%-wt with the energy consumption of 1.32 kJ/mL.

Keywords:

Biodiesel; Contact Glow Discharge Electrolysis; Hydroxil Radical

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Extraction of Rare-Earth Elements Using Mechanical and Chemical Processes with Oxalic Acid

Zakaria Jaka Bahari[1], Eny Kusrini[*1], Sri Harjanto[2], Nici Trisko[1]

[1]*Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, 16424, Indonesia*

[2]*Department of Metallurgical and Materials, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, 16424, Indonesia*

Corresponding authors: E-mail: ekusrini@che.ui.ac.id, Tel. 62-21-7863516 ext. 204, Fax. 62-21-7863515

The present work describes the extraction of rare earth elements (REE) from tailing bauxite by mechanical and chemical processes with oxalic acid. The aim of this study to obtain the best condition for upgrading and extraction of REE from the tailing bauxite. The effects of magnetic separation, mechanical treatment and chemical process were studied in details. The tailing bauxite sample was-pre-treated by (i) reduce the particle size until 200 mesh (74 µm), (ii) wet magnetic separation using below 1,400 gauss. After treated by mechanical process, then the sample was extracted by chemical process using 1.0 mol/L oxalic acid solution at 75°C for 2 hours to reduce the content of iron oxides in the tailing bauxite. The rare-earth oxalate was obtained and purified by the addition of sodium sulphate in order to obtain the precipitation of rare earth element (REE)-sodium disulphate ($NaREE(SO_4)_2.xH_2O$). To obtain the individual rare earth elements, the REE-sulphate sample is converted into high soluble compound, namely REE-hydroxide using sodium hydroxide (NaOH) solution.

Keywords:

Bauxite Tailing; Chemical And Mechanical Processes; Magnetic Separation; Oxalic Acid; Rare-Earth Elements

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Separation of Lanthanides from Tailing Bauxite Using Mechanical and Chemical Processes with Sulphuric Acid

Nici Trisko[1], Eny Kusrini[*1], Sri Harjanto[2], Zakaria Jaka Bahari[1]

[1]Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, 16424, Indonesia

[2]Department of Metallurgical and Materials, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, 16424, Indonesia

Corresponding authors: E-mail: ekusrini@che.ui.ac.id, Tel. 62-21-7863516 ext. 204, Fax. 62-21-7863515

The present work describes the separation and purification of lanthanides (Ln) from tailing bauxite by combination of mechanical and chemical processes. The effects of magnetic separation, mechanical and chemical processes were studied in details. Pre-treatment of the tailing bauxite was conducted by using particle size of 200 mesh (74 μm) and wet magnetic separation using below 1400 gauss to reduce the iron oxides. After treated by mechanical process, the sample was extracted with chemical process using 3.0 M sulphuric acid solution at 80°C for 2 hours. Following the procedure, ammonium hydroxide was added into lanthanide-sulphate solution and reached the pH 3.5. The suspension was filtrated to obtain the precipitated lanthanide-hydroxide. Finally, the Ln-phosphate was obtained using sodium phosphate after 1 h. The lanthanide content in all precipited samples were analyzed by inductively coupled plasma mass spectrometry (ICP-MS).

Keywords:

Chemical And Mechanical Processes; Lanthanide-Phosphate; Magnetic Separation; Sulphuric Acid; Tailings Bauxite

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Experimental Investigation on the Heat Transfer Characteristics of Zeilite Adsorbent Coated Fin-Tube Heat Exchanger

Kyungjin Bae[a], Ting Chen[b], Dongan Cha[a], Ohkyung kwon[a, b, *]

[a]Korea Institue of Industrial Technology, 89 Yangdaegiro-gil Ipjang-myeonl, Cheonan-si 31056, Republic of Korea
[b]Advanced Energy and Technology, Korea Institute of Industrial Technology Campus, Korea University of Science and Technology, Cheonan 31056, Republic of Korea
**Corresponding author.*
Email adress: kwonok@kitech.re.kr.

In this paper, adsorbent coating thickness of heat exchangers; 0.1 mm, 0.15 mm, 0.2 mm are experimented. The adsorbent used for the present adsorption experiment is a powder zeolite(FAPO). The performance of adsorbent coating heat exchanger was analysed by heat transfer rate and adsorption rate with adsorption time. In the basic conditions, the maximum overall heat transfer coefficient of 2 mm coating thickness is 189.1 $W/m^{2o}C$, which is 18%, 50% higher than that of 0.15 mm and 0.1 mm, respectively.

Keywords:

Adsorption; Heat Exchanger; Overall Heat Transfer Coefficient; Zeollite

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Effect of Sodium Tripolyphosphate Concentration and Simulated Gastrointestinal Fluids on Release Profile of Paracetamol from Chitosan Microspheres

Kamarza Mulia, Andrie, Elsa Krisanti

Chemical Engineering Department, Faculty of Engineering
Universitas Indonesia, Depok, 16424, Indonesia
E-mail: kmulia@che.ui.ac.id

The problem to overcome in oral drug administration is the significant pH changes present in the human digestive system. In this study, ionotropic gelation method employing 2-8% (w/v) tripolyphosphate solutions were used to crosslink chitosan microspheres for a controlled release of paracetamol as a model drug. The release profiles of paracetamol from chitosan microspheres were determined using simulated gastrointestinal fluids having pH values of 1.2, 6.8, and 7.4. The results showed that the paracetamol loading and the encapsulation efficiency values increased with increasing concentration of tripolyphosphate solutions used in the preparation step. Paracetamol release at pH 1.2 and pH 6.8 buffer solutions was significantly higher than that at pH 7.4, also, more paracetamol was released in the presence of α-amylase and β-glucosidase enzymes. The release profiles showed zero-order release behavior up to 8 hours where the highest drug release was 39% of the paracetamol loaded in the chitosan microspheres, indicating a strong crosslinking between chitosan and TPP anions. The relatively low accumulated drug release could be compensated by employing suitable enzymes, lower TPP solution concentration, and other biodegradable polymer to reduce the crosslink due to TPP. In conclusion, this study indicated that the chitosan microspheres prepared by this method can be developed for preparing controlled drug release formulation.

Keywords:

Release Profile; Chitosan; Tripolyphosphate; Ionotropic Gelation; Paracetamol

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Investigation on the Hull Material for Solar Powered Electrical Sport Boat

Sunaryo[a], Pradhana S Imfianto[b], Aldy Syahrihaddin Hanifa[c]

[a, b, c] *Naval Architecture and Marine Engineering Study Program, Department of Mechanical Engineering, Universitas Indonesia, E-Mail: [a]:naryo@eng.ui.ac.id, [b]:pradhana.sadhu@ui.ac.id, [c]:aldy.syahrihaddin@ui.ac.id*

Analyses of sandwich materials that used in design of a water recreational and sport vessel that powered by solar generated electric engine are required to fully compatible to the hull strength of the boat. The work is a further development of the solar boat created by the Universitas Indonesia team that participated in International Solar-boat Challenge competition in the Netherlands. The aim of the work is investigate the strength of the modified hull material, and its manufacturing processes based on the calculation formulas provided in Bureau Veritas': Rules for Hull in Composite Materials and Plywood, Material Approval, Design Principles, Construction and Survey (NR 546 DT R00 E). The analyses are applied to the panel under global loads (laminate buckling, maximum stress in each layer, and combined stress) in order to determine the strength of the boat hull. In this study, the mechanical properties (tensile and flexural) of facing laminate and sandwich material were made using VARTM (Vacuum Assisted Resin Transfer Molding) or known as Vacuum Infusion. The Panel is made of two different materials (High Strength Carbon Fiber 240 gr/m2 and Lantor Soric XF 5 mm) infused with Ripoxy R-802 EX-1 (vinyl ester resin).

Keywords:

Hull Strength, Sandwich Material; Solar Powered Boat; VARTM-Vacuum Infusion

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The Quality of Analog Rice from Composite Flour: Modified Cassava Flour, *Canavalia ensiformis* and *Dioscorea esculenta* Using Hot Extrusion

Siswo Sumardiono[1,a)], Isti Pudjihastuti[2,a)] and Noer Abyor Handayani[1,c)]

[1]*Chemical Engineering Department, Faculty of Engineering, Diponegoro University*
Diponegoro University Campus, Tembalang, Semarang, Central Java, Indonesia
[2]*Program Study of Chemical Engineering,*
[a)]*sumardiono@gmail.com*
[b)]*istipudjihastuti@gmail.com*
[c)]*nora@undip.ac.id*

Indonesia is the third largest country on the global paddy rice production, however it is also considered as a rice importer. Even, Indonesia has the largest per capita consumption of paddy rice in the world with it consumes about 140 kilograms of paddy rice per person per year. Various attempts have been conducted by the Government to reduce imported rice rate. Product diversification using local commodities from Indonesia is one of appropriate solutions. Artificial rice, is a kind of product variety, might be developed as a new value product using different types of grains with or without added some nutrients and functionalities. Artificial rice was produced by hot extrusion method using composite flour original commodity from Indonesia (modified cassava starch, Canavalian ensiformis, and Dioscorea esculenta). Their high nutrition content are promising to use as food ingredients. The objectives of this study were to design and fabrication of hot extruder capacity 10 kg/day. Some formulations of artificial rice were also investigated in compare with commercial paddy rice. This study consists of three main stages, preparation of modified cassava starch, Canavalian ensiformis, and Dioscorea esculenta's flour, formulation, and artificial rice production. Artificial rice has been successfully conducted using prototype of hot extruder with the temperature 70C. Physical analyses (color, rehydration capacity and texture) and proximate analyses were carried out to artificial rice product and commercial paddy rice. In fact, the artificial rice is expected to be alternative products non paddy rice which could reduce people's reliance on rice and might be used as a staple food in Indonesia.

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Optimization Study of (0,12), (0,15), and (0,18) SWCNT's Chirality on Ideal Pressure Hydrogen Gas Storage: The Implementation of Neural Network Configuration

Maya Lestari[a], Supriyadi[b], Sholahudin[a], Nasruddin[a]*

[a)] Departement of Mechanical Engineering Universitas Indonesia, Depok, Jawa Barat 16424, Indonesia
[b)] Departement of Mechanical Engineering Universitas Trisakti, Jakarta Barat 11440, Indonesia

Swcnt as adsorbent of hyrogen gas with various chirality have difference effect on adsorption capacity. On the ideal pressure of hydrogen gas storage, chirality (0,12), (0,15), and (0,18)-SWCNTs were observed to find the optimum chirality to adsorb the hydrogen. The neural network is used to predict hydrogen storage capacity on different pressure condition precisely without conducting simulation. The neural network configuration formed in the previous research applied for the present work. On the previous research, the configuration of artificial neural network had been developed for temperature 77k, 233k, and 298k in hydrogen gas storage. The results reveal that the implementation of neural network configuration show best temperature hydrogen storage that is on 233k with SWCNT chirality (0,12) where this chirality shows the rise chart of weight percent (hydrogen capacity on storage) against the rising of pressure.

Keywords:

SWCNT, Chirality, Neural Network Configuration

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Synthesis of Graphite-Magnetic Nanoparticles Fe_3O_4 and Its Application as Adsorbent for Carbon Dioxide

Eny Kusrini[1*], Angga Kurniawan Sasongko[1**], Nasruddin[2], Chairani Shafira Utami[1], Atik Suhrowati[1]

[1]Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI, 16424 Depok, Indonesia
[2]Department of Mechanical engineering, Faculty of engineering, Universitas Indonesia, Kampus UI, Depok, 16424, Indonesia
**Corresponding author's e-mail address: ekusrini@che.ui.ac.id,*
***Email: angga.sasongko14@gmail.com, Tel.: +62-21-7863516 ext. 204, Fax: +62-21-7863515*

The abundance of graphite waste can be processed into valuable materials, one alternative is by making it as an adsorbent. Graphite-based adsorbent modification can be accomplished by adding magnetic Fe_3O_4 nanoparticles. The addition of magnetite nanoparticles has been reported to improve adsorption ability of the graphite. In this research, we modified the graphite waste by adding magnetite nanoparticles Fe_3O_4 using impregnation technique. The sorbents were characterized by SEM-EDX and BET. The modified graphite is then tested using carbon dioxide gas (CO_2) to observe its adsorption ability as a gas adsorbent. In this research, the CO_2 adsorption testing was carried out using isothermal adsorption method with various temperatures (30, 35, and 45^0C) and pressures (3, 5, 8, 15, and 20 Bar). The results graphite with different magnetite modification levels, namely non modified graphite (GNM), graphite/Fe_3O_4 20% (w/w) (G/Fe_3O_4 20%) and graphite/Fe_3O_4 35% (w/w) (G/Fe_3O_4 35%) indicated that the largest adsorption capacity is 0.453 kg/kg at 30^0C and 20 Bar pressure for G/Fe_3O_4 20% (w/w). This finding further indicate that modifying graphite waste with magnetite nanoparticles Fe3O4 has proved to increase adsorption capacity for adsorbing CO_2 gas.

Keywords:

Adsorption Isotherm; Carbon dioxide; Graphite Waste; Magnetite Nanoparticle Fe_3O_4

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Synthesis and Characterization of Graphite Waste with CeO_2 Using Mechanically, Thermal and Chemically Methods

E Kusrini[1*], C S Utami[1], Nasruddin[2], A Suhrowati[1], A S Kurniawan[1]

[1]*Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia, Depok, 16424, Indonesia*
[2]*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia, Depok 16424, Indonesia*
**E-mail: ekusrini@che.ui.ac.id*

In this research, the modification of graphite waste by chemically modified with CeO_2 was developed and characterized. Graphite waste was pretreated with mechanical to obtain the sieze 200 mesh (75 μm), and thermal methods at 110°C oven for 6 hours. Here, we demonstrate simple pretreated and chemically technique to synthesis graphite/CeO_2 composite, namely graphite before modification (GBM), activation graphite (GA) and modified graphite with variation of 0.5, 1 and 2 g of CeO_2 (G0.5; G1; G2). The effect of CeO_2 concentarion was observed. The presence of cerium in modified graphite samples (G0.5; G1; G2) waere analyzed using SEM-EDX. The results show that the best surface area was found in G2 is 26.82 m^2/g. The presence of CeO_2 onto graphite surface is not significant to increase surface area of composites.

Keywords:

Adsorption; CeO_2, Graphite Waste

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Faculty of Engineering Universitas Indonesia
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Phone : +62-21- 7863503, Fax : +62-21 – 7270050
Email : qir@eng.ui.ac.id,
Website : qir.eng.ui.ac.id
eng.ui.ac.id