



# ABSTRACT BOOK

"TOWARD SMART AND SUSTAINABLE  
IN TECHNOLOGY AND ENGINEERING  
SCIENCE"

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**FACULTY OF ENGINEERING  
UNIVERSITAS SRIWIJAYA**

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## ABOUT US

Toward Smart and Sustainable Innovation in Technology and Engineering Science

The Sriwijaya International Conference on Engineering and Technology 2023 (SICETO 2023) is a platform that aims to bring together academic scientists, researchers, designers, students, technologists, and experts from related fields to discuss the latest advances, trends, and innovations in engineering, technology, and science. The conference will be held in Palembang, a beautiful tropical city in Indonesia, on October 17-18, 2023.

In line with the theme of "Towards Smart and Sustainable Innovation in Technology and Engineering Science", SICETO 2023 aims to explore the latest developments and share knowledge in these fields. The conference provides an excellent opportunity for researchers to discuss their research works and exchange new ideas with fellow professionals from around the world.

The Scientific Committee, composed of researchers and academics, will review and approve submitted abstracts to ensure the scientific quality of the conference program. We are committed to organizing an event that upholds the highest standards of quality and excellence.

We look forward to welcoming you to SICETO 2023, where we can explore the latest trends, innovations, and developments in technology and science together. Join us in Palembang and be a part of this exciting event.

### **Where**

THE ZURI HOTEL, Palembang - South Sumatera - Indonesia

### **When**

Tuesday to Wednesday

17-18 October 2023



## **PREFACE RECTOR**

Rector: Welcome Speech from the Rector of Universitas Sriwijaya



I am delighted and honoured to greet you all at the Sriwijaya International Conference on Engineering and Technology 2023 (SICETO 2023). In today's world, globalization has created a highly competitive environment in all areas. In order to create a positive and sustainable future, this flourishing competition should address the harmony and balance between human demands and environmental quality.

A balance between human development and innovation to improve the quality of life and its harmony with nature must be maintained as a means to achieve a sustainable future. Today, researchers and industry experts collaborate to create and develop technologies that we can enjoy and are also expected to influence the sustainable future better.

Innovative thinking requires more than just amazing ideas. Resources, skills, technology, information, tools, approaches, and much more are required for innovation. But, above all, innovations necessitate the participation of people. People are at the heart of any desire for change, whether to improve quality of life, better living conditions, or just make life easier and more pleasant.

This conference is about understanding the underlying features that have the potential to impact the world and society, thinking ahead to potential global challenges, and uncovering innovations connected to industry prospects. Furthermore, this conference is expected to bring together interdisciplinary people to accelerate activities in many areas simultaneously. This is what makes the conference exceptional this year in terms of potential impact from this networking.

I extend my sincere thanks to the Faculty of Engineering, Universitas Sriwijaya, supporting parties and institutions for their participation and contributions in SICETO 2023. Furthermore, I would like to express my deepest gratitude to all the organizing committees, which dedicating their personal time to ensure that every one of us has an outstanding conference program over the next several days. May the conference be successful, stimulating, fruitful, and enjoyable.

**Prof. Dr. Taufiq Marwa, S.E., M.Si.**

Rector of Universitas Sriwijaya

## PREFACE DEAN

Dean: Welcome Speech from the Dean of Faculty of Engineering Universitas Sriwijaya



Welcome to the Sriwijaya International Conference on Engineering and Technology 2023 (SICETO 2023). The Faculty of Engineering Universitas Sriwijaya is proud that we held an international conference of this grand scale this year. This biennial two-day conference emphasizes the importance of establishing connections among national and international front-liners, thinkers, academics, executives,

government and business officials, practitioners, and leaders from all over the world to share knowledge and best practices part of a global network.

Srivijaya Empire is kingdom that flourished between the 7th and the 13th centuries, largely in what is now Indonesia. The kingdom originated in Palembang and soon extended its influence and controlled the Strait of Malacca. Srivijaya's power was based on its control of international sea trade. It established trade relations with the states in the Malayu Archipelago and with China and India. Srivijaya continued to grow; by the year 1000, it controlled most of Java, By the end of the 12th century, Srivijaya had been reduced to a small kingdom, and Malayu had taken its dominant role in Sumatra. A Javanese kingdom, Majapahit, soon came to dominate the Indonesian political scene.

Palembang is the capital city of the South Sumatra province of Indonesia. Currently, this city, the oldest existing city in Indonesia, dates back to the 7th century. Palembang was incorporated into Dutch East Indies in 1825 after the abolishment of the Palembang Sultanate. Palembang was chartered as a city on 1 April 1906.

Palembang today is the second largest city in Sumatra and the ninth largest city in Indonesia.

This SICETO 2023 seminar is the second seminar held at the Faculty of Engineering, University of Sriwijaya. We are committed to maintaining this tradition by carrying it every two years. We believe that after two years, we will produce many research results that need to be shared with our colleagues in other institutions.

I am hopeful that the intellectual discussion will lead to future collaborations between universities, research institutes, and industry both locally and internationally. It is envisaged that topics concerning innovations for the betterment of human life and the environment will receive special attention. Let's make this conference an international media for exchanging knowledge, experience, and research and the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in the broad field of eco-based technology development.

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 practitioners from Indonesia and overseas, welcome and enjoy your stay in Palembang. I would also like to invite all participants in expressing our appreciation to all members of the SICETO 2023 organizing committee for their hard work in making this conference another success.

**Prof. Dr. Eng. Ir. Joni Arliansyah, M.T.**

Dean Faculty of Engineering Universitas Sriwijaya



## **WELCOME SPEECH SICETO 2023 CHAIRMAN**

Welcome Address: Sriwijaya International Conference on  
Engineering and Technology 2023 (SICETO 2023)



Good morning everyone. Welcome to the Sriwijaya International Conference on Engineering and Technology 2023. I am Heni Fitriani, a lecturer in the Department of Civil Engineering at Universitas Sriwijaya. As the chair of the committee, I will not be able to stand here, in front of all of you today, if not for the wonderful committee members on the organizing committee who have been with me from the start.

We envision four key values as the building bricks of the foundation on which we will construct our effort and hard work in order to make this conference a reality: rigor, impact, prestige, and service. These essential ideals are achieved through various components of the conference.

For accuracy, we ensured it through double-blind peer review and clear criteria for acceptance of abstracts. This careful selection process makes the conference the best forum to discuss various topics in the scientific field.

Participants in this seminar came from various scientific fields from 13 countries.

consisting of:

- 37 papers from Civil and Structural Engineering
- 11 papers from Electrical and Electronic Engineering
- 10 papers from Chemical Engineering and Science
- 31 papers from Mechanical Engineering
- 12 papers from Architecture
- 17 papers from Mining and Geological Engineering
- 2 papers from Natural Science

and all selected papers at SICETO 2023 will be published at Semarak Ilmu Publishing Journals indexed by Scopus.

As for service, we deliver our best through the committee who takes the participants' best interests at heart; taking care of the participants throughout the conference; as well as appreciating and recognizing outstanding papers by awarding best paper.

This conference is the result of the hard work, support, and dedication of a number of parties. We wish to thank all the committee members who together make the conference possible. The committee has been working throughout the year to propose sessions, review a record number of submissions, answer queries, arrange the schedule, and response to last-minute requests. Last but not least, we thank all the authors and reviewers who are the backbone of this conference.

Thank you for being here with us. We value your presence at this conference. Enjoy the conference.

**Prof. Ir. Heni Fitriani, S.T., M.T., Ph.D., IPU., Asean.Eng**  
Chairwoman, Organizing Committee

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Online & Offline Conference

October 17<sup>th</sup> – 18<sup>th</sup>, 2023

Palembang – South Sumatera, Indonesia

Universiti Teknologi Malaysia Kuala Lumpur, Kuala Lumpur, Malaysia

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CEPT University, India

Online & Offline Conference

October 17<sup>th</sup> – 18<sup>th</sup>, 2023

Palembang – South Sumatera, Indonesia



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## CONFERENCE PROGRAM

### RUNDOWN

Date	Time	Agenda
OCT 17, 2023	07:30 – 08:30	Registration
	08:30 – 09:30	Opening Ceremony Indonesia Raya Song Dance performance: Tari Tanggai Report from SICETO 2023 Chairman Speech by the Dean of Faculty of Engineering UNSRI Opening Remarks by Rector of UNSRI Moment & Photo session Prayer
	09:30 – 09:35	Coffee Break
	09:35 – 12:00	Panel Session 1 Prof. Sunkuk Kim, Ph.D, P.E. Prof. Novia, ST, MT, Ph.D Prof. Hafiz M.Ali Q&A
	12:00 – 13:00	Lunch
	13:00 – 14:45	Panel Session 2 Prof. Saheed O. Ajayi Prof. Mitsunori Ozaki Q&A

	14:45 – 15:45	Parallel Session 1
	15:45 – 15:55	Coffee Break
	15:55 – 16:55	Parallel Session 2
	16:55 – 17:00	Closing Day 1
Date	Time	Agenda
	07:30 – 08:30	Registration
	08:30 – 08:45	Opening Day 2 by MC
	08:45 – 10:15	Parallel Session 3
OCT 18, 2023	10:15 – 10:30	Coffee Break
	10:30 – 12:00	Parallel Session 4
	12:00 – 13:00	Lunch
	13:00 – 14:00	Closing Ceremony Best Paper Announcement Report from SICETO 2023 Chairman Closing Remarks by Dean of Faculty of Engineering UNSRI



PARALLEL SESSION OF INVITED SPEAKER

*Oct 17, 2023*

*ROOM 1*

<b>Time</b>	<b>Invited Speaker</b>	<b>Affiliation</b>
14:45 - 15:05	Prof. Dr. Ir. Budiarmo, M.Eng	University of Indonesia, Indonesia
15:05 - 15:25	Ahmad Fudholi, Ph.D	National Research and Innovation Agency (BRIN), Indonesia

*Oct 18, 2023*

*ROOM 1*

<b>Time</b>	<b>Invited Speaker</b>	<b>Affiliation</b>
08:45 - 09:05	Dr. M. Reza Hosseini	Deakin University, Australia
09:05 - 09:25	Prof Mona Iyer	Cept University, India

09:25 - 09:45	Dr. Olonade Kolawole Adisa	University of Lagos, Nigeria
09:45 - 10:05	Prof. Hafiz Alaka, Ph.D	Hertfordshire University, United Kingdom
10:05- 10:25	Prof. Sridevi Balu	Vellamal Institute of Technology, India

*Oct 18, 2023*

*ROOM 2*

<b>Invited Speaker</b>		<b>Affiliation</b>
08:45 - 09:05	Doriane Meyer, Ph.D	Del Mar College, USA
09:05 - 09:25	Dr. Intisar Ameen Tyne	Texas State University, USA
09:25 - 09:45	Prof. Dr. Jeffrey D. Rimer	University of Houston, USA
09:45 - 10:05	Prof. Dr. Noor Azwadi bin Che Sidik	University Technology Malaysia, Malaysia

Online & Offline Conference  
October 17<sup>th</sup> – 18<sup>th</sup>, 2023

Palembang – South Sumatera, Indonesia

10:05- 10:25	Dr. Makatar Wae- Hayer	Songkla University, Thailand
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**CITY TOUR**

<b>TIME</b>	<b>ACTIVITY</b>	<b>DESCRIPTION</b>
14:00- 14:30	TOUR PREPARATION	Assembly at The Zuri Lobby
14:45- 15:00	Trip to ZAINAL SONGKET	Tour Bus
15:00- 16:00	ZAINAL SONGKET	Local craft shopping tour
16:00- 16:30	Trip to JAKABARING	Tour Bus
16:30- 18:00	MASJID CHENG HO	
	JAKABARING SPORT CITY	
18:00- 18:30	Trip to RESTAURANT	Tour Bus
18:30- 21:00	BENTENG KUTO BESAK	
	AMPERA	
	DINNER	

## CONFERENCE SCOPES

Sriwijaya International Conference on Engineering and Technology 2023 (SICETO 2023) will be held on October 17–18, 2023, at ZURI Hotel Palembang (under confirmation), Palembang – South Sumatera, with the following topics but not limited to:

### **Civil and Structural Engineering**

- Green constructions
- Material and structure
- Transportation system and engineering
- Sustainable construction technologies and management
- Water and environmental engineering
- Geotechnical engineering
- Etc

### **Electrical and Electronic Engineering**

- Computer engineering
- Control theory and control system
- Fibre optics
- High voltage
- Measurement and instrumentation
- Power system
- Power electronics
- Sensor system
- Robotics and autonomous system
- Wireless
- Signal processing
- Information technology

Online & Offline Conference  
October 17<sup>th</sup> – 18<sup>th</sup>, 2023

Palembang – South Sumatera, Indonesia

- Electronics, circuits and systems
- pervasive computing and internet of thing
- Etc

## **Chemical Engineering and Science**

- Organic chemistry
- Polymer processing
- Process system, control, and safety
- Heat, Mass and Momentum Transfer
- Chemical Reaction Engineering and Catalysis
- Thermodynamics
- Separation and Purification Technology
- Bioprocess and Biochemical Engineering
- Clean Production and Waste Management
- Energy Conversion and Management
- Advanced and Smart Material Development
- Food Science and Technology
- Modelling, Simulation, Control and Analysis of Manufacturing Processes
- Etc

## **Mechanical Engineering**

- Energy conversion
- Fluid Mechanics, heat and mass transfer process
- Thermodynamics
- Wind, gas, and hydro turbine
- Manufacturing processes and systems
- Materials Sciences and materials Engineering
- Machining

- Metal forming
- Injection molding
- CAD/CAM
- Product design
- Computational
- Metal joining
- Vibration engineering
- Mechanical analysis
- Mechanical dynamics and vibration
- Mechanical strength / design
- Casting technology and equipment
- Additive manufacturing
- Etc

## **Architecture**

- Sustainable housing and settlements
- Urban and rural planning
- Vernacular architecture
- Architectural heritage and conservation
- Building performance and green architecture
- Architecture design
- Etc

## **Mining and Geological Engineering**

- Seismic investigation
- Natural resources utilization
- Renewable energy
- Petroleum science
- Coal Upgrading

- Mineral processing
- Exploration and exploitation
- Geohazard and environment
- GIS and hazard mitigation
- Geotech and Hydrogeology
- Geotourism and Geoconservation.
- Hydrometeorology and Climate Change
- Mineral and Coal.
- Oil and Gas
- Petrology, Volcanology, and Metamorphic
- Palaeontology and Palaeobotany
- Petroleum Geoscience
- Structural Geology & Tectonic
- Sedimentology and stratigraphy
- Unconventional and renewable energy
- Etc

## **Natural Science**

- Biology
- Chemistry and Pharmacy
- Statistics
- Physics
- Mathematics and Statistics
- Etc

## CONFERENCE INFORMATION

The Zuri Hotel Palembang

### Conference Venue

The Zuri Hotel Palembang  
Jl. Radial No.1371, 26 Ilir, Bukit Kecil, Palembang City, South  
Sumatra – Indonesia

### Function Areas

The various function of the conference will take place at the  
following locations:

#### Pre-Registration

Hotel Lobby (First Floor)  
Tuesday & Wednesday, 17-18 October 2023,

#### Welcome Party

Ballroom (Third Floor)  
Tuesday & Wednesday, 17-18 October 2023,



#### Registration

In Front of Ballroom  
Tuesday & Wednesday, 17-18 October 2023,

#### Secretariat

Hotel Lobby (First Floor) and Zuri Room 10

Online & Offline Conference  
October 17<sup>th</sup> – 18<sup>th</sup>, 2023

Palembang – South Sumatera, Indonesia



## **Opening Ceremony & Keynote Speakers**

Ballroom (Third Floor)

Tuesday & Wednesday, 17-18 October 2023,

## **Banquet/Barbeque Dinner**

Restaurant (Third Floor)

Tuesday & Wednesday, 17-18 October 2023,

## **Closing Ceremony**

Ballroom (Third Floor)

## **Parallel Sessions**

- **Offline Conference**  
Zuri Room 6 & 8 (Second Floor)
- **Online Conference**  
Zuri Room 2,3,4,5, & 9 (Fifth Floor)

## **Coffee/Tea Break**

- **Offline Conference**  
Zuri Room 6 & 8 (Second Floor)
- **Online Conference**  
Zuri Room 2,3,4,5, & 9 (Fifth Floor)

## **Lunch**

Restaurant (Third Floor)

## **Banquet**

Pool Side, The Zuri Hotel

Tuesday & Wednesday, 17-18 October 2023,

## **Language**

The official language of the conference is English





## TIME ZONE MAP

	Jakarta, Indonesia WIB (UTC +7)	Tue, 17 Oct 2023	09:00
	Kuala Lumpur, Malaysia MYT (UTC +8)	Tue, 17 Oct 2023	10:00
	Tokyo, Japan JST (UTC +9)	Tue, 17 Oct 2023	11:00
	Taipei, Taiwan CST (UTC +8)	Tue, 17 Oct 2023	10:00
	London, UK BST (UTC +1)	Tue, 17 Oct 2023	03:00
	New Delhi, India IST (UTC +5.30)	Tue, 17 Oct 2023	07:30
	Turkey, TRT TRT (UTC +3)	Tue, 17 Oct 2023	05:00
	Cairo, Egypt EET (UTC +2)	Tue, 17 Oct 2023	04:00
	Riyadh, Saudi Arabia AST(UTC +3)	Tue, 17 Oct 2023	05:00
	Jakarta, Indonesia WIB (UTC +7)	Tue, 17 Oct 2023	09:00

[www.siceto.conf.unsri.ac.id](http://www.siceto.conf.unsri.ac.id)

# *SICETO* 2023

SRIWIJAYA INTERNATIONAL CONFERENCE ON ENGINEERING AND TECHNOLOGY

17-18 OCTOBER 2023  
THE ZURI HOTEL, PALEMBANG, INDONESIA

## KEYNOTE SPEAKERS

"TOWARD SMART AND SUSTAINABLE IN  
TECHNOLOGY AND ENGINEERING SCIENCE"

*Organized by:*



Faculty of Engineering  
Universitas Sriwijaya





Leeds Beckett  
University, Leeds,  
United Kingdom

**Prof. Saheed O. Ajayi, Ph.D.**

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King Fahd  
University of  
Petroleum and  
Minerals, Saudi  
Arabia

**Assoc. Prof. Dr. Hafiz M. Ali**

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Kyung Hee  
University, South  
Korea

**Prof. Sunkuk Kim, Ph.D., P.E.**

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Kanazawa  
University, Japan

**Prof. Dr. Mitsunori Ozaki**

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Universitas  
Sriwijaya,  
Indonesia

**Prof. Novia, Ph.D.**

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Paper ID : 354

**ENHANCING PRODUCTIVITY AND SUSTAINABILITY  
THROUGH BIM-BASED PLUGINS – A CASE STUDY OF  
AUTOBIM CARBON DIAGNOSTICS SYSTEM**

Saheed O. Ajayi

School of Build Environment, Engineering and Computing, Leeds  
Beckett University, UK

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**Abstract** - The construction faces challenges relating to its safety concerns, low productivity, and environmental impacts, among others, notwithstanding its significant contribution to job creation and economic development of every nation. To address these multifaceted challenges, Building Information Modelling (BIM) has been envisioned as a transformative approach. In line with this development, the present paper presents the development and implementation of AutoBIM Carbon Calculator, a BIM-based plugin system integrated with Revit software, that supports the estimation and management of embodied carbon in construction projects. The paper outlines the AutoBIM design and development methodology, which is based on participatory action research approach, involving automated approach for data extraction from BIM models, and carbon calculation algorithm that is integrated with carbon convention factor library. Based on a case study project, evidence shows the ability of the AutoBIM calculator in reducing time spent on carbon calculation by 97% while also automatically identifying carbon hotspot to facilitate design optioneering for carbon effectiveness. In addition, the case study project demonstrates 14% carbon reduction by supporting alternative design decision making. AutoBIM calculator, as a BIM-based plugin serves as a promising example of how technology-driven

solutions could address multifaceted challenges facing the construction industry by highlighting the potential of BIM-based plugins to enhance productivity, efficiency and sustainability of the construction industry.

Paper ID : 401

**THERMAL MANAGEMENT OF ELECTRONICS – ACTIVE  
AND PASSIVE TECHNIQUES**

Hafiz Muhammad Ali

Mechanical Engineering Department, King Fahd University of  
Petroleum and Minerals, Dhahran, 31261, Saudi Arabia

Corresponding author: hafiz.ali@kfupm.edu.sa

Abstract - With the advances in manufacturing processes and ever-increasing technological capabilities, far superior electronics devices are now available. However, the heat dissipation during the electronics activities has become a major issue now. Therefore, proper thermal management of such electronics devices is vital to operate them at optimal output. This talk will cover the available materials and fluids that are used for thermal management of such devices. Important properties of fluids and materials that are used for active and passive thermal management will be discussed. Experimental studies performed on the thermal performance using geometrically enhanced heat sinks with fluids and phase change materials will be presented. Critical parameters such as set point temperature, heat transfer coefficients at various flow conditions, effect of nanoparticles concentrations on the heat transfer rate, limitations and barriers and future perspectives will be presented as well.

Paper ID : 280

## **OPTIMIZATION ALGORITHM FOR NEAR-ZERO REBAR CUTTING WASTE (N0RCW) AND LESS REBAR USAGE**

Sunkuk Kim\*, T S N Rachmawati, D D Widjaja

Department of Architectural Engineering, Kyung Hee University,  
Giheung-Gu, Yongin, 17104, Korea

\*Corresponding author: kimsuk@khu.ac.kr

**Abstract** - The significant global carbon emissions stem from excessive rebar usage and rebar-cutting waste. Several studies have investigated minimizing cutting waste by optimizing cutting patterns and adjusting lap splice positions. However, these efforts have still generated more than 5% of rebar-cutting waste. Therefore, this study aims to develop an optimization algorithm by varying lap splice position within the structural members, using special-length rebar, and reducing the number of lap splices to achieve near-zero rebar cutting waste and less rebar usage. The algorithm was implemented for continuous beam rebars, and the findings confirmed a reduction in rebar usage by 0.237 tons, equivalent to a 9.37% decrease compared to the original design. Moreover, the cutting waste rate reached 0.6%, indicating near-zero rebar cutting waste was achieved. Applying this algorithm to construction projects involving multiple continuous beams will amplify the benefits accordingly.

Paper ID : 279

**CYCLOTRON PLASMA WAVE-PARTICLE INTERACTION  
IN GEOSPACE AND ITS INDUCED OZONE DESTRUCTION**

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Abstract - Circular polarized plasma waves in magnetized plasmas can act as a natural herical coil. The plasma waves can significantly contribute to acceleration and deceleration of charged particles around near-Earth's space including the geostationary orbit (geospace). A part of scattered plasmas penetrates to the atmosphere from the geospace, then illuminate visible auroral phenomena around altitudes of 100 to 300 km. Moreover, relativistic (MeV) energy electrons scattered by the plasma waves can penetrate down the mesosphere (50 to 80 km) and lead the atmospheric ionization for resulting of localized ozone destruction just below the auroral phenomena. The specific auroral phenomena driven by the plasma waves become an important ionospheric screen for recognizing the duration and location of atmospheric impacts ionized by the precipitating relativistic electrons. In this presentation, the author will present a brief summary of the overview of plasma wave-particle interactions and related auroral phenomena probed by Arase satellite and PWING ground-based observations, which are scientific projects for probing dynamics of electromagnetic environments in geospace.

Paper ID : 404

**RECENT PROGRESS IN BIOETHANOL PRODUCTION  
FROM LIGNOCELLULOSIC BIOMASS: TECHNOLOGICAL  
DEVELOPMENTS AND CHALLENGES**

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Abstract - Due to carbon savings and climate change mitigation, the industrialization of cellulosic bioethanol has attracted worldwide enthusiasm for its application as an alternative fuel blended with petroleum. Modern cellulose-based bioethanol refineries face considerable environmental problems, nevertheless, as a result of varying biomass structure, inherent resistivity, along insufficient availability of economical pretreatment and subsequent processes. As part of this, we have enumerated the worldwide condition of existing cellulosic bioethanol resources, together with the most significant obstacles and technological obstacles for commercially viable and sustainable cellulosic bioethanol manufacture. Furthermore, this paper describes both the technological and non-technique obstacles, as well as the numerous R&D developments in biomass pretreatment procedures, enzymatic hydrolysis, and fermentation techniques that have been considered for economical, environmentally friendly bioethanol. In addition, deciding on an economical, effective pretreatment technique, process modeling, section integration, the latest technology in simultaneous saccharification and fermentation (SSF), mechanism microbiology engineering for robust strain development, and detailed techno-economic analysis are all essential.

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Doriane Meyer, Ph.D.



Dr. Mohamad Nadim Adi



Prof. Dr. Mona Iyer

Paper ID : 389

**BENCHMARKING EMBODIED CARBON: ARE CURRENT  
STANDARDS FALLING SHORT?**

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Abstract - Amidst the backdrop of improving energy efficiency in buildings and a concurrent shift towards decarbonized energy grids, current trends indicate a notable increase in the proportion of embodied carbon contributing to the total emissions in buildings. As embodied carbon emerges as the predominant factor in carbon emissions of buildings, its overall volume continues to surge due to the escalating demand for new buildings. To curtail emissions, a multitude of mechanisms, including standards and rating systems, have been developed. Most of these resources have sought to delineate carbon reduction objectives by defining benchmarks for embodied carbon within building projects. In this study, a comprehensive review of the existing benchmarks by prominent rating systems is presented. These benchmarks are critically compared against the potential emissions of baseline buildings within the context of each respective rating system. The findings illuminate a significant revelation, indicating that buildings can readily comply with these benchmarks without necessitating any interventions. By providing compelling quantitative evidence, this study underscores the argument that current benchmark limits are unduly lenient, thus compelling a call to action in terms of redefining new, more ambitious benchmarks for buildings, particularly considering the looming and urgent impacts of global warming.

Paper ID : 384

**PRELIMINARY STUDY ON RECIRCULATION VORTEX  
AND TURBULENCE INSIDE ULTRA LOW HEAD PICO  
HYDRO CROSS-FLOW TURBINE WITH  
COMPUTATIONAL FLUID DYNAMICS METHOD**

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Abstract - Cross-flow turbines (CFT) have evolved since the first investigation in 1949. After some use of computational fluid dynamics (CFD) simulations in CFT development, it is known that there might be a recirculation vortex inside the CFT. At the CFT internal flow, some significant turbulent flow occurred, which is indicated by a higher value of turbulence kinetic energy (TKE). However, the turbulence's effect inside this turbine still evokes many questions. This study ran Several CFD simulations on three CFT blade designs. One of them has already been tested experimentally, and the others are the modifications of the first design. There are two scenarios for the simulations: run in a traditionally two-phase condition or in a submerged state to maximize the usage of the potential head. This study found that at the modified blade design condition, high TKE values were found in many places at the internal flow of CFT. However, the turbulence eddy dissipation rate between existing and modified blades of the two scenarios remains the same. Those

discussed phenomena impact the efficiency of the turbine, where on two-phase CFT work, it increases relatively 15% of efficiency and 39% relative escalation for the submerged condition.

Paper ID : 402

**DESIGNING STATE-OF-THE-ART ZEOLITE CATALYSTS  
FOR ENERGY SUSTAINABILITY**

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Abstract - A common objective of zeolite catalyst design is to overcome the inherent mass transport limitations of nanopores, often through the design of nanosized or hierarchical materials; however, the complex pathways of zeolite crystallization make it difficult to control their physicochemical properties. This talk will highlight key advancements in our research group over the past several years to develop new synthetic methods to achieve materials with enhanced internal diffusion for applications in catalysis. Our group uses diverse techniques to elucidate mechanisms of zeolite crystallization and apply this knowledge to the rational design of zeolite catalysts. This talk will describe recent approaches of seeding and interzeolite transformation as versatile methods to achieve optimal materials, including the synthesis of pillared zeolites with exceptional catalytic performance compared to conventional analogues. This talk will also cover synthesis strategies using secondary growth to markedly reduce mass transport limitations with and without the addition of inorganic growth modifiers. Examples include methods to passivate external sites via epitaxial growth of coresells. Our findings also reveal that coreshell (or zoned) zeolites with Si-rich exterior surfaces can dramatically reduce diffusion limitations, thereby resulting in catalysts that are far superior to analogues with homogeneous distributions of acid sites. As additional examples of zeolite crystal

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engineering, we will describe structure-performance relationships of various hierarchical materials. Lastly, we will introduce a new class of catalysts, referred to as finned zeolites, which are prepared by seeded growth to introduce fin-like protrusions (size  $\alpha$ ) with identical crystallographic registry as the interior crystal (size  $\beta$ ). Examples of both 2- and 3-dimensional zeolites will be discussed using catalytic testing and state-of-the-art characterization techniques such as high-resolution electron tomography, operando spectroscopy, novel acid titration methods, and molecular modelling to correlate structural features of finned zeolites and their diffusion properties with enhanced catalyst performance.

Paper ID : 390

**PREDICTING CRITICAL FACTORS DETERMINING  
ADOPTION OF OFFSITE CONSTRUCTION IN NIGERIA- A  
MACHINE LEARNING APPROACH**

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Abstract - Several factors influence OSC adoption, but only few extant literatures articulated the dominant barriers or drivers influencing adoption, with little or no information on OSC developments in Africa. Therefore, this research has not only ventured into analyzing the core influencing factors but has also employed one of the best-known predictive means, Machine Learning, to identify the most influencing OSC adoption factors in Nigeria as a template for Africa. The research methodology involves an initial examination of critical factors through a thorough literature review, followed by the validation of these factors using a 5-point Likert scale survey questionnaire. The survey responses were meticulously assessed for reliability before being subjected to Machine Learning algorithms to discern the most influential OSC adoption factors within the Nigerian Construction Industry (NCI). The study is region-specific, focusing exclusively on Nigeria. Nevertheless, the findings lay a foundational understanding of OSC adoption potential, not only within Nigeria but also across Africa and beyond. This research not only identifies the most effective algorithms for predicting OSC adoption but also sheds light on critical influencing factors essential for the successful implementation of OSC within the NCI, addressing the persistent housing shortage. Prominent algorithms for predicting OSC adoption encompass Decision Tree, Random Forest, K-Nearest Neighbour,

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Extra-Trees, AdaBoost, Support Vector Machine, and Artificial Neural Network. The study underscores the significance of financial considerations, awareness, the integration of Building Information Modeling (BIM), and the belief in OSC as the primary factors shaping adoption. In conclusion, this research emphasizes that, with dedicated attention to the identified factors, OSC can gain a solid foothold in Nigeria and, by extension, throughout Africa. The predictive models generated here can also serve as a valuable template for regions contemplating OSC adoption.

Paper ID : 375

**EFFECT OF CROSS-SECTIONAL DEPTH ON  
HORIZONTAL AND 30° SLOP SPILLWAY OPEN CHANNEL  
PICO HYDRO CROSS-FLOW TURBINE EFFICIENCY**

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Abstract - Harvesting the kinetic energy from the small dam's spillway downstream flow in agricultural areas is interesting. On the other hand, a cross-flow turbine (CFT) is a unique impulse turbine because it works at a higher specific speed, which means this turbine works at the lower head and higher water flow rate. Thus, there is an opportunity to use a CFT to harvest the energy in the spillway. There are two possible scenarios: at the flat horizontal and the 30° slop flow. Several computational fluid dynamics (CFD) simulations were conducted to test the hypothesis. The simulations were performed with five variations of the ratio between the cross-sectional depth parameter of the spillway's flow before approaching the turbine for each scenario. The total head in the present study case is 3.0 meters with 40 l/s of water discharge. The simulations used student version ANSYS® Fluent™ for 2D CFD simulation. The tests found that the

CFT could attain 80.36% efficiency. Moreover, some water flows over the turbine at a higher rotational speed, leading to a significant loss in turbine performance, called potential loss. This finding indicates that the CFT could harvest the spillway's flow kinetic energy when the flow is not too deep.

Paper ID : 285

**ENHANCING COMBUSTION EFFICIENCY IN  
COMBUSTION CHAMBER: A COMPARATIVE STUDY OF  
SINGLE AND DOUBLE TANGENTIAL INLET  
CONFIGURATIONS**

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Abstract - A study was conducted on a combustion chamber, with a primary focus on evaluating the influence of different air inlet configurations, specifically the single tangential inlet (ST) and double tangential inlet (DT), on combustion performance and flue gas. The feedstock was palm kernel cake, with a steady flow rate of 3 kg/hr, while the airflow is regulated to maintain an excess air ratio (EAR) of 2. The investigation encompasses temperature profiles, streamline analyses, and flue gas composition, all of which were crucial factors in assessing the combustion efficiency (C.E.) of these configurations. The results revealed distinct advantages associated with the DT configuration. It consistently demonstrated higher temperatures, symmetrical flow patterns, and improved combustion efficiency when compared to the ST setup. These findings underscore the DT configuration as a more efficient and environmentally friendly choice for combustion processes.

Paper ID : 391

## DIGITAL POOMPUHAN

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**Abstract** - In the Indian subcontinent, Poompuhar on the east coast and Dwarka on the west coast were great flourishing port cities in ancient times which are destroyed by sea during earlier 300 BC. Since the beginning of the 20th century, it has drawn the attention of historians, archaeologists, and other scholars from other areas due to its exquisite architectural design and the narratives about culture and civilization. The Indian government has taken steps to investigate the Poompuhar city, which can shed light on historical behaviors, customs, trade, and culture. Our planned effort involves employing 3D modelling to recreate submerged and dilated structures underwater as part of the Digital Poompuhar process. The goal of the proposed investigation is to collect precise digital photography data through three digital technology stages: pre-processing, enhancement and presentation, and data extraction. Analysis of short-term spatial change in this dynamic environment is another area of investigation that is essential for sustainable coastal management. Using the information at hand, the following phase of investigation will offer 3D modelling of the desired region or item. Underwater imaging is done with an in-house remotely controlled vehicle, and the photographs are afterwards processed for 3D modelling, which may be utilized to provide precise measurements of the target region. The methods used for post-processing, such as creating a 3D orthomosaics model and doing 3D photogrammetric measurements.

Paper ID : 392

**FLEXURAL FATIGUE LIFE OF COCONUT FIBRE  
REINFORCED EARLY CARBONATED BINARY CEMENT  
MORTAR COMPOSITE**

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Abstract - Using fibre to reinforce matrix (polymer or cementitious) is becoming a major area of research due to the need to ensure sustainable material. Different properties of the fibre reinforced matrix have been studied with little or no information on the fatigue life of coconut fibre reinforced mortar matrix. Taking into consideration that many of these materials are exposed to cyclic loading in the real life, this property becomes exigent. In this paper, fatigue life of coconut fibre reinforced mortar is presented. This is a follow up to our past studies on the use of coconut fibre (CF). A predetermined mortar made from blended of cement and rice husk ash (RHA) as binder was prepared and reinforced with fibre content of 0.5 (S0.5), 1 (S1), and 1.5% (S1.5) by volume weight of the binder and aggregate, while normal mortar without fibre (S0) was used as control. The mix was initially cured in carbon chamber (15% carbon dioxide, 60°C and 60% relative humidity) for 6 hours after 24 hours it was cast. Thereafter, they were cured in polythene until the 7<sup>th</sup> day from the day they were cast. Static flexural strength of each of the samples S0 to S1.5 were determined. After that, the samples (new set) were subjected to cyclic loading with a frequency of 3Hz, using two stress levels corresponding to 80% of each of the static flexural strength of S0 to S1.5 and 80% of the of normal matrix (S0). The fatigue life



representing the number of cycles to failure were determined. The data obtained were subjected to statistical analysis and the parameters of Weibull function parameters were evaluated. The results indicated that the presence of fibre increased the flexural strength and toughness of the sample when up to 1% of fibre was used but the strength reduced afterwards. For the fatigue life, it was found that the fibre content was not statistically significant ( $p>0.05$ ), when 80% stress level of each of the static flexural strength were used. But the results showed that the presence of fibre elongated the fatigue life, when stress level of 80% of the normal matrix was used for all the samples for fibre content less than 1.5% ( $p<0.05$ ). The conclusion from this study was that coconut fibre has potential to increase the fatigue life of cement mortar. Nevertheless, further may need to look at performance at different frequencies and stress levels.

Paper ID : 353

**APPLICATION OF FUNCTIONAL ANALYSIS AND  
FUNCTIONAL ADJACENCY GRAPH ANALYSIS TO  
UNDERSTAND THE AVAILABILITY AND DISTRIBUTION  
PATTERN OF OUTDOOR SPACES IN ASYLUM DESIGN**

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Abstract - According to the tenets of moral therapy, during the 19th century, it was assumed that incorporating gardens, natural light, soothing views and ventilation, are therapeutic for mental illness. Many 19th century scholars (Physicians and architects) suggested outdoor activities for patients including walking, gardening, farming and exercising (Browne,1837; p.190). 19th century asylum design applied these theoretical tenets in design and constructed many courtyards, garden and drying yards inside asylums. However, in the middle of 19th century research tenets shifted and suggested that outdoor activities were not beneficial for the well-being of female patients therefore, number of female courtyards should be reduced in asylums. Male patients were more likely to get better when working in the farms and gardens whereas, female patients recovered while working in kitchens and laundries (Conolly,1847; p,79). How the design of outdoor spaces in the 19th century asylums responded to these two opposite perspectives are yet to be identified. The study aims to identify if and to what extent asylum design applied these theoretical tenets and how the availability and access to outdoor spaces/ courtyards differed for male and female patients, in the 19th century English asylums. This study analyses a set of chronological asylum case studies constructed between 1851 to 1914, to track how the availability and access to courtyards differed for male and female patients. The case studies are selected from a well-known

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British journal, ‘The Builder’. Two methodologies are used for this study: function analysis and functional adjacency graph analysis. Number and location of courtyards are measured in the functional analysis whereas functional adjacency graph helped to understand the accessibility, and proximity to courtyards. Rather than reducing the number of courtyards for female patients, some case studies had more female courtyards than male courtyards (Middlesex County Asylum (1851), Middlesex Fourth Asylum (1889)). The ratio of patient ward to courtyard was similar in the male and female patient sides in the other asylums. In all asylums, access to the male and female courtyards were similar. However, the title of female courtyards was different than male courtyards. Female patients had to work in the laundry hence had access to a drying yard. Whereas male patients had to work outdoor for farming and workshops hence they had access to work yards. In the 19th century asylums, patient work became a crucial component for profit making and a practical standard to measure patient recovery. The equal availability and accessibility of courtyards in the 19th century asylums suggests that the design principles were not applied into asylum design and there was no gender-based discrimination in designing outdoor spaces. The findings also suggest that outdoor spaces were designed for work-related purposes not only for outdoor activities to promote patients’ wellbeing. Female patients had to work in the laundry therefore they had no extra time for outdoor activities. Whereas male patients used the outdoor spaces more than the females as their work was related to farming. As a result, it was impossible to measure if outdoor activities were beneficial for the well-being of female patients or not because female patients were not allowed to spend time outdoors.

Paper ID : 393

**ANALYZING SOCIO-SPATIAL DISPARITIES IN  
BRAZILIAN CITIES: THE ROLE OF AI, SPACE SYNTAX,  
AND LIDAR IN ADDRESSING URBAN SEGREGATION**

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Abstract - Urban segregation presents formidable challenges in the quest to build inclusive cities, as it influences the socio-spatial distribution of resources, services, and opportunities. This paper explores the potential of integrating Artificial Intelligence (AI), Space Syntax, and LiDAR technology as innovative tools to address these challenges. These tools can promote equitable urban development and mitigate urban segregation by harnessing the power of data-driven decision-making, smart urban planning, transportation and mobility optimization, affordable housing solutions, environmental sustainability, and community engagement. The paper presents case studies from Brazilian cities such as São Paulo, Rio de Janeiro, and Salvador to illustrate socio-economic and ethnic disparities. Despite its wealth, Brazil is home to millions of people living in slums or favelas, underscoring the stark contrast between affluence and poverty. These favelas have their roots in the post-abolition era when former slaves began occupying vacant land around cities. Over time, these communities have developed their own infrastructure with minimal government support. However, the majority of residents are of African descent, highlighting the ethnic divide within these cities. Spatial segregation exacerbates this divide, with affluent neighborhoods and favelas often located in close proximity but leading vastly different lives. The paper underscores the urgent need for inclusive urban development strategies to address these stark contrasts. It outlines the potential benefits of modern technologies in

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analyzing these areas and emphasizes the importance of community involvement in creating more inclusive and equitable cities. The paper advocates for a comprehensive approach that leverages AI's data-processing capabilities, Space Syntax's spatial connectivity analysis, and LiDAR's high-resolution mapping to identify areas requiring targeted interventions and enable evidence-based policymaking.

Paper ID : 415

## **DESIGNING A MORE HUMANE HOSPITAL, USING VIRTUAL REALITY TO EVALUATE HOSPITAL DESIGNS**

Mohamad Nadim Adi

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Abstract - Hospitals are facilities that provide acute health care services to patients through an interdisciplinary team of practitioners. However, for older people, hospitalization can be a hazardous experience that leads to preventable adverse outcomes. The World Health Organization (WHO) predicts that by 2050, 135.5 million people will be afflicted with dementia. Persons with dementia are twice as likely to be hospitalized as their peers and are at risk of experiencing deconditioning, which can further enhance cognitive, physical, and functional decline. This can result in increased risk for hospital readmission, morbidity, earlier mortality, and higher rates of long-term care placement . In this Talk I will discuss the approach I took through research to propose a series of design guidelines for a more safe and humane hospital design and how I am currently in the process of using virtual reality as a tool to assess the proposed guidelines.

Paper ID : 395

**CLIMATE HAZARD ASSESSMENT TOOL & RESILIENT  
INITIATIVE FOR SCHOOLS IN KODINAR, INDIA**

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Abstract - Climate change pose serious threats to the human and its ecosystem. The year 2015 has witnessed serious impacts of climate change. Unsustainable development has exacerbated climate change which further magnifies and increases the frequency of hazard and disaster. As compared to adults, children are more vulnerable to the Climate change. It has serious impacts on children's education leading to compounding effect on their wellbeing and development. Education is an important tool for climate change mitigation and adaptations. In global and local climate change action plans, education's role is focused towards leveraging the public awareness, participation, access to information, and improving the skills required to initiate and promote sustainable development. Increasing the awareness education would contribute to effective mitigation and adaptation to climate change. The research aims at developing an action plan for Climate-resilient schools to cope with adverse seasonal changes and extreme events by identifying and improving the components of a climate resilient school. Kodinar, Gujarat has been identified for the base study based on the District Disaster Management Plan 2021. The government schools in Kodinar, where the majority of the taluka's students attend school, are the subject of the research study. The research includes two stages: firstly, assessing risk posed to schools and their occupants to the climate change hazards and second to evaluate the existing resilient capacity of the schools to cope with the direct and indirect impacts of climate change. This would enable in proposing initiatives to improve the climate resilience of the schools.

It is aspired that this research would act as a decision-making tool which would enable in initiating a discussion on the challenges faced by school administration to tackle climate change hazards and promote climate resilience in schools to overcome the challenges. The existing identified challenges can be an opportunity to improve the resilient capacity of schools and in building the stakeholder capacity of future generations and the community to tackle the challenge. Thus, sowing the seeds of climate resilience in the future generation who would be agents of change.



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Paper ID : 268

**CAPACITY ANALYSIS OF REINFORCED CONCRETE AND  
COMPOSITE CONCRETE WITH THE NONLINEAR TIME  
HISTORY OF IMPERIAL VALLEY EARTHQUAKES**

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Abstract - The design of a water intake system will be a highly efficient water use plan for the future fulfilment of water resources. In the case of pump intake building, a pier-type intake with reinforced concrete, steel structures and composite steel piles was used. 3D finite element modelling with a nonlinear time history loading method using the ETABS programme was conducted to determine the failure performance of the structural capacity. The ground motion data utilised were Imperial Valley-06 of 1979, which were matched with the response spectrum of Bengkulu City and entered into the programme as earthquake load scaled to 2 times the original scale. The results of the structural capacity analysis included floor deviation, beam deflection, composite ratio and steel frame ratio. When the earthquake scale was increased to  $1.5 \times A_{0g}$ , structural damage occurred in the steel columns because the damage ratio value was  $\geq 1$ , indicating that the steel structure's load value exceeded the steel material's stress-strain capacity. The reinforced concrete pile cap

beams also showed evidence of structural damage due to increased seismic loads because the deflection value of the beam structure exceeded the predetermined allowable deflection value. However, no structural failure occurred in the composite column structure because the capacity of the composite material was still able to withstand the earthquake's magnitude.

Paper ID : 269

**COMPUTATIONAL FLUID DYNAMICS ANALYSIS TO  
EVALUATE EFFECT OF FURNITURE ON THERMAL  
COMFORT IN RESIDENTIAL HOUSE**

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Abstract - Energy consumption in a residential house is usually derived from the number of family members and household income. Domestic electricity consumers in Malaysia contribute 82% out of 10.08 million consumers in Malaysia. This paper presents a Computational Fluid Dynamic (CFD) analysis of three different scenarios of wooden furniture placement indoors to wind circulation and thermal comfort. The weather data on temperature and wind velocity were taken from average historical weather data for the Putrajaya area. The CFD analysis was conducted during the daytime and night with different wind velocities and enveloped temperatures. It was determined that the effect of the furniture during the day was insignificant. However, at night the room without furniture and with less furniture in Scenario 1 and Scenario 2 had a faster temperature drop than the room with packed furniture. There is a +1.0 to +1.2 improvement in PMV at night compared to PMV during the day.

Paper ID : 275

**THE EFFECT OF THE RATIO OF FLY ASH TO ALKALINE  
ACTIVATOR AND THE MOLARITY OF NAOH ON THE  
MECHANICAL PROPERTIES OF FLY ASH-BASED  
AGGREGATES**

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Abstract - The increase in global demand for aggregates, both locally and globally, has resulted in a decrease in the availability of quality natural aggregates. In the early 2000s, a new approach to artificial aggregate production emerged known as the cold bond pelletization (CBP) process, which was applied to dry powdered fly ash. In this method, fly ash particles are agglomerated in an inclined rotating pan at room temperature to form fly ash pellets. This kind of research is carried out through experimental methods in the laboratory. In the CBP method, the Aggregate Impact Value (AIV) test was carried out to study the effect of variations in the ratio of fly ash to alkaline activator (FA/AA) and variations in the molarity of Sodium Hydroxide (NaOH) on the mechanical properties of the aggregate. The effective molarity value for geopolymer-made aggregates using the cold bond pelletization method is 15 molar which has the lowest AIV percentage value. The AIV value of geopolymer aggregates from variations FA/AA 3 to variations FA/AA 3.25 experienced a decrease. Then it decreased again from the FA/AA variation of 3.25 to the FA/AA variation of 3.5. The effective value of the FA/AA ratio of geopolymer-made aggregates using the cold bond pelletization method is 3.5 FA /AA with an average value. The value decreased at

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a molarity of 13 molar to 15 molar. However, it experienced an increase in the 17 molar variation.

Paper ID : 276

**EFFECT OF CURING TIME AND VARIATION THE  $\text{Na}_2\text{SiO}_3$   
RATIO WITH  $\text{NaOH}$  AGAINST THE MECHANICAL  
PROPERTIES OF GEOPOLYMER-MADE AGGREGATES  
BASED ON *FLY ASH* WITH THE METHOD *CRUSHING***

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Abstract - In industry construction, aggregate role as component main in making concrete, asphalt, and construction materials other. Aggregate originating nature from source Power natural such as crushed stone, gravel, and sand, have become source important power in project development infrastructure during many years. However, increasing global demand for aggregate, well in a manner local as well as globally, causing decline availability aggregate quality nature. At the start 2000s, appeared approach new in production aggregate known manufacture as a cold bond pelletization (CBP) process, which is applied to powdered fly ash dry. In method in this case, the fly ash particles are agglomerated in pan tilted at temperature room for form pellets fly ash. In addition, the crushing method is used for get aggregate artificial geopolymer with desired size. Aggregate can destroyed become more particles small use technique destruction like destroyer mechanical or tool such as a Hammer Mill, Jaw Crusher, or Ball Mill. Study sort of This done through method experimental in the laboratory. In the crushing method, AIV testing is also carried out for observe influence ratio of  $\text{Na}_2\text{SiO}_3/\text{NaOH}$  on properties mechanic aggregate. The percentage of AIV reaches 13.20% at the  $\text{Na}_2\text{SiO}_3/\text{NaOH}$  2 ratio, however decrease to 12.64% at a  $\text{Na}_2\text{SiO}_3/\text{NaOH}$  ratio of 3.5. So, ratio effective for aggregate artificial

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geopolymer with crushing method is  $\text{Na}_2\text{SiO}_3/\text{NaOH}$  3.5. Additionally, additions sand in aggregate artificial geopolymer crushing method also affects characteristic tested mechanic via AIV. The percentage of AIV reached 12.82% without addition sand, however decrease to 12.64% of the time addition sand by 20%. However, the AIV value increased to 12.76% of the time addition sand up to 40%. So, addition sand as much as 20% can produce low AIV value in the aggregate geopolymer. Effect of curing time on characteristic mechanic aggregate artificial geopolymer crushing method was also tested via AIV. The percentage of AIV reached 12.64% at curing for 24 hours, however decrease to 12.46% at 48 hours curing. However, AIV increased to 12.94% at 72 hours of curing. The duration of the curing process using the oven has an effect on the aggregate AIV value geopolymers, where the longer curing, the AIV values tend to be increase. As For example, at 72 hours of curing, the AIV value increases to 12.94% of mark previously ie 12.46% at 48 hours curing

Paper ID : 284

## **EVALUATION OF PORT RESILIENCE TO DISASTERS: AN OVERVIEW OF INFRASTRUCTURE ASSESSMENT**

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Abstract - Marine infrastructure plays an important role in the distribution of goods and people in Indonesia; one example is ports. The function of the port is very important, so daily operational activities must continue to be carried out to serve the needs of the community. In this service process, the port is expected to survive natural disasters that can occur at any time. In this research, the first step taken in obtaining an assessment of the port's ability to deal with disasters is to collect references to find out previous research by reviewing some of the literature obtained from Google Scholar, Scopus, ScienceDirect, and DOAJ. The results of the study obtained eight criteria, such as condition, capacity, operation and maintenance, funding, future needs, public safety, resilience, and innovation. of these criteria become indicators in further research

Paper ID : 287

**TRAVEL BEHAVIOR INTENTION DURING THE COVID-19  
PANDEMIC IN INDONESIA: THE EXTENSION OF GOAL-  
BEHAVIOR MODEL**

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Abstract - COVID-19 has received considerable attention in this decade. In January 2020, this pandemic spread worldwide, resulting in a new rule concerning people's behavior termed the new normal era. Likewise, the changes in people's behavior compel changes in transportation behavior worldwide. The impact of COVID-19 is mostly felt in developing countries, which can't stand without economic resilience. As a developing country, Indonesia experienced a great impact immediately after the COVID-19 policy was announced as a new normal adaption era and after four months of being impacted by COVID-19. Thus, this study aims to investigate the impact of the new normal adaption of the COVID-19 pandemic on people's intention and decision to travel in Indonesia. The model of goal-behavior (MGB) was used as a base model to examine travel behavior decisions. The extension dimension about the perception of COVID-19 and perception of new normal behavior is used to complete the MGB for this study. The structural equation model was applied to observe the overall extension of the MGB. Practically, this study's finding and implications deal with the issue of COVID-19 that has resulted in the alteration of people's travel behavior; this finding

and implication would be valuable for government agencies, transportation policy makers, transport systems providers, and, indirectly, tourist travel behavior during pandemics in next future.

Paper ID : 291

**DIFFERENTIAL SYNTHETIC APERTURE RADAR  
INTERFEROMETRY IN MONITORING BRIDGE  
DEFORMATION CAUSED BY FLOOD EVENT**

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Abstract - Many vital infrastructures, which are necessary for society and the economy to function, are heavily reliant on in the modern world. Any interruption to such crucial processes can have adverse effects on society. Large transportation networks must be thoroughly inspected, which requires expensive infrastructure management costs. As a result, early signs of challenges can go unnoticed, which could result in disastrous structural failures. In order to evaluate structural safety over time, infrastructure assets must be monitored. This paper presents bridge deformation changes monitoring over time using differential interferometry before and after a flood event at Lahat Regency, South Sumatra Province, Indonesia. By analyzing the remote sensing radar data, deformation patterns and structural integrity that might endanger a bridge and its users can be identified. The vertical and horizontal displacements are estimated at 30 to 40

mm after the flood. The data may be utilized to improve bridge design by exposing elements that cause bridge deformation over time and help assess the damage for priority repairs.

Paper ID : 295

**THE PLANNING OF BICYCLE LANES TO SUPPORT THE  
GREEN CAMPUS IN THE SRIWIJAYA UNIVERSITY  
INDRALAYA CAMPUS**

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Abstract - The usual mode Sriwijaya University students in Indralaya Campus use is a private vehicle, but a few students also choose public transportation such as small buses and Damri. Sriwijaya University plans to create a green campus environment. Therefore, UNSRI plans to use bicycles as a substitute for private vehicles and public transportation around the Indralaya campus to create a green campus environment. This research was conducted to plan safe and comfortable bike lanes and determine bicycle users' interest in planning bicycle lanes on campus. Analysis of bicycle planning in this study using Vissim software to determine LOS (bicycle level of service) with three scenarios. Based on the analysis and data processing results on Vissim obtained from the three bicycle service levels scenarios, most road performance is in LOS A. The best scenario in this bike lane planning is scenario 2, which is the bike lane with the shortest route that takes public roads. The questionnaire was distributed to 100 respondents, including students, lecturers, and UNSRI employees. Based on the distribution of questionnaires and results, 80% of respondents agreed to plan bicycle lanes on campus.

Paper ID : 300

**ANALYSIS OF BLACKSPOT MEASUREMENT (CASE  
STUDY: JALAN SISINGAMANGARAJA, SOUTH JAKARTA)**

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Abstract - Sisingamangaraja Road is the name of one of the main roads in Jakarta. This road is named after an Indonesian National Hero, Di Singamangaraja XII. The road stretches for 2 KM from Melawai, South Jakarta, to Senayan, South Jakarta. This road is one of the roads with high traffic volume and a high frequency of traffic accidents. Based on the background information above, this report is prepared to address the existing accidents on Sisingamangaraja Road from Melawai, South Jakarta, to Senayan, South Jakarta, by providing recommendations based on the analysis of accident identification processed using the method from the Highway Safety Manual (HSM) 2010. Based on field observations and accident data analysis on Singamangaraja Road in Melawai, South Jakarta, it's clear that road conditions and accessories, like missing road signs, poor lighting, and absent road markings, play a significant role in accidents. To address this, we recommend general improvements like repainting road markings, adding traffic signs, fixing road shoulders and uneven surfaces, and enhancing safety measures. Additionally, enforcing speed limits with cameras, ensuring proper helmet use, and promoting the use of lights during the day can help prevent accidents.



Paper ID : 306

**MECHANICAL PROPERTIES OF POLYMER CONCRETES  
BY SILICA (SiO<sub>2</sub>) NANOMATERIALS**

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Abstract - Nanomaterials are making significant advances in science and technology. Compared to micro-based materials, nano-sized particles are better fillers. Nanosilica is a widely used nanomaterial in the production of concrete. This study investigates the impact of nanosilica on the mechanical properties of polymer concrete. The study found that the highest compressive strength of 45.23 MPa and specific gravity of 1570.67 Kg/m<sup>3</sup> were achieved with 0.35% nanosilica substitution. In comparison, the material without nanosilica reached a compressive strength of 41.56 MPa and weighed 1577.67 Kg/m<sup>3</sup>. The results demonstrate the significant impact of nanosilica in the improvement of both compressive strength and specific gravity of the specimens.

Paper ID : 333

**CONNECTION DESIGN STEEL COLUMN-BEAM WITH  
BOLT AND PLATE BASED ON SPECIAL MOMEN FRAME  
SYSTEMS**

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Abstract - Intake structures are clean water supply buildings located on the banks of the river. This structure consists of reinforced concrete with pile foundations, and the intake structure consists of a profiled steel frame as the upper column beam structure. Implementing steel structures requires a high degree of accuracy, especially in designing connections on sectional steel beams and columns. Therefore, this study aims to determine the dimensions of steel profiles referring to the design of bolt connections at SNI 1729-2020, which are optimal for steel profile beam-columns due to pump loads and load combinations. Based on the analysis, it is concluded that the three types of materials still meet the safety requirements of the failure benchmark for the structural ratio value  $\leq 1$ , and the structural deflection value is still below the required allowable deflection value. After analysing the ability of the steel column and beam cross section to withstand the pump load, it was found that the optimum connection at the bolts was with 8 bolts of 24 mm diameter and the optimum additional steel plate connection was with a plate thickness of 13 mm.

Paper ID : 336

**ANALYSIS OF THE BEARING CAPACITY OF GROUP PILE  
FOUNDATIONS WITH THE VESIC METHOD**

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Abstract - This study focuses experimentally on the carrying capacity of group pile foundations used in the Palembang Health Polytechnic Dental Nursing Lecture Building, considering that this type of foundation is able to support a large enough load. To determine the efficiency of the bearing capacity of pile foundations, calculations were made based on N-SPT data using the Vesic 1977 method and existing. The study was conducted at the PC-9A point at the Palembang Health Polytechnic Dental Nursing Building using variations in diameter  $\varnothing 30$ ,  $\varnothing 40$ ,  $\varnothing 50$ ,  $\varnothing 60$ , 35 x 35, 40 x 40, and 45 x 45 at depths of 11, 12, 13, 14, 15, 16 meters, with a fixed concrete quality of K-500. The results of the calculation of the bearing capacity of the group pile foundation, on PC-9A in Vesic 1977 amounted to 2761.576 kN and used vesic 1977 amounted to 2763.28 kN with a difference of 23%. The largest foundation carrying capacity is located at 40 x 40 dimensions with a carrying capacity of 3698.97 kN, while the smallest foundation carrying capacity is located at 30 diameters with a carrying capacity of 2784.84 kN. The results of the calculation of variations on the efficient PC-9A are<sup>1</sup>  $\varnothing 30$  depth 12 m with a

volume of 7.6302 m, Ø30 depth 14 m with a volume of 3.9564 m<sup>3</sup>, Ø40 depth 12 m with a volume of 7.6302 m<sup>3</sup>, Ø40 depth 13 m with a volume of 3.6738 m<sup>3</sup>, 35 x 35 depth 13 m with a volume of 6.370 m<sup>3</sup>, 40 x 40 depth 13 m with a volume of 8.30 m<sup>3</sup> with a carrying capacity of 3698.97 kN.

Paper ID : 342

**FACTORS AFFECTING SLOPE STABILITY  
IMPROVEMENT USING SOIL NAILING**

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**Abstract** - Soil nailing method is used to enhance slope reinforcement. This technique employs a top-down construction approach, meaning construction is built from the top and then downwards. Analysis is carried out on the use of soil nailing for both internal and external stability. The research locations are Terusan Village as STA 194+420 (case 1) and SP. Sugih Waras Village at STA 429+312 (case 2). The factor of safety (FOS) calculation for the soil nailing reinforcement is done using the Slope/W software program. The soil nailing reinforcement modelling comprises 27 variations. The reinforcement design aims to address slope conditions with reinforcement, such as: long distance, placement intervals, and reinforcement angles. The analysis result of this research explains that the nail length, placement interval, and changes in installation angle influence the value of slope's FOS. Higher angles, longer nails, and closer placement intervals can increase the slope's FOS. Three optimum combinations were identified with FOS values: installation angles of 10, 15, and 20 for case 1 and case 2. The results FOS for case 1, the value  $F_{ST}$  is 5,167;

$F_{SP}$  is 5,301;  $F_{SG}$  is 1,622,  $F_{SSL}$  is 2,431; and  $F_{SH}$  is 5,953. And the results FOS for case 2 the value  $F_{ST}$  is 1,846; FOS  $F_{SP}$  is 2,464;  $F_{SG}$  is 1,622,  $F_{SSL}$  is 2,974; and  $F_{SH}$  is 9,452. Higher slopes, longest nails, and closer mounting space can increase the value of slope FOS.  
Keywords: Slope Stability, Reinforcement, Soil Nailing, Factor of Safety (FOS).

Paper ID : 347

**THE PERFORMANCE OF VACUUM CONSOLIDATION  
METHOD IN SOFT SOIL IMPROVEMENT**

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Abstract - Soft soil in South Sumatra is typically composed of soft clay and peat soil, predominantly occupying swampy areas with low soil-bearing capacity. These soil conditions cannot be avoided for construction purposes, necessitating its improvement before utilization. One of method used for improvement of soft soil is Vacuum Consolidation Method (VCM). Therefore, this study presents projects that have employed VCM, as well as discussed, the limitations of the method and how to enhance its performance.

Paper ID : 357

**THE IMPORTANCE OF NON-FAIRBOX SECTOR  
REGULATIONS TOWARD LIGHT RAIL TRANSIT (LRT) IN  
PALEMBANG SOUTH SUMATRA IMPACT ON THE  
ENVIRONMENT AND DEVELOPMENT OF URBAN  
BUSINESS**

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Abstract - Light Rail Transit (LRT) Palembang is a fast transit initiative between regions within the city of Palembang which provides 13 stations on the LRT fast transit line and 1 Depot that connects the Jakabaring area to Sultan Machmud Badaruddin II airport, land transportation density is a catalyst for transit-oriented comparative analysis in big cities like the city of Palembang. Developed countries with a success rate of mass transportation implement regulations in the non-farebox sector which plays an important role in supporting revenue outside the farebox sector. The non-farebox sector includes four main business fields outside of transportation services, namely advertising, retail, telecommunications, and activation events.



Paper ID : 358

**SYNTHESIS OF NANOCELLULOSE FROM PAPER WASTE  
- *LOW ENERGY CONCEPT***

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Abstract - Nanotechnology is increasingly developing and has contributed to various fields, one of which is the construction industry in concrete mixed materials. Nanocellulose is a variant of nanomaterial sourced from organic fibers. Nanocellulose in this research was synthesized using an alkaline method based on paper waste from offices and schools. The synthesis method uses NaOH and NaClO solutions. 3%, 6%, and 9% NaOH solutions and 2% NaClO solutions with heating variations of 30, 45, and 60 minutes, at a temperature of 75°C. Physical, chemical, and microstructural characteristics with Particle Size Analyzer (PSA), X-ray diffraction (XRD), Scanning Electron Microscope (SEM), and Energy Dispersive X-ray (EDX). PSA results obtained particles ranging from 20-500nm. XRD results showed a higher amorphous percentage after synthesis using alkali, 9% NaOH percentage with a duration of 60 minutes, namely 70-80%. By carrying out treatment using NaOH and NaClO you can remove the lignin and hemicellulose structures in cellulose fibers. SEM results show that the structure size is smoother and cleaner after treatment with NaOH and NaClO. The EDX test results explain that with NaOH and NaClO the chemical content has properties close to cement which can be used in concrete mixtures.

Paper ID : 360

**BUILDING PLANNING ANALYSIS USING A COMPARISON  
OF THE EFFICIENCY OF EXPERT RESOURCES USING  
BUILDING INFORMATION MODELING (BIM) SOFTWARE  
AND CONVENTIONAL METHODS**

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Abstract - This study aims to compare the resources of experts using the Building Information Modeling (BIM) method and conventional methods in the construction industry. BIM is an information technology-based approach that utilizes integrated 3D models to plan, design and manage construction projects. The conventional method, on the other hand, refers to the traditional approach which does not use an integrated 3D model. This study conducted a review of relevant literature and research articles that compared the two methods in terms of expert resources. The results of this literature review can provide useful insights for construction professionals and practitioners in considering the advantages and disadvantages of each method. the use of Building Information Modeling (BIM) software is more efficient in managing expert resources in planning the Makassar Apartment DELFT construction project compared to conventional methods. This conclusion is supported by statistical analysis showing significant differences between the two methods.

Paper ID : 362

**DESIGN OF SECONDARY CHANNELS FOR IRRIGATION  
AREAS BASED ON WATER NEEDS STUDY**

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Abstract - The overall need for irrigation water needs to be known because it is one of the important stages required in planning and managing an irrigation system. The aim of this research is to analyze the design of secondary channels for irrigation areas based on water needs. This research was carried out in five stages, namely literature study; secondary data collection; primary data collection; identification of water system patterns; and analysis of calculations and conclusions. Studies Libraries are carried out by collecting and reviewing data and information from papers, reports, design drawings, journals and books related to this research, among others regarding tidal swamp land, hydrometry channels, and modeling, also Analysis of Irrigation Water Needs. From the results of the calculations that have been carried out, it can be seen that the water requirement for the secondary irrigation channel of Lindu Baliase in one planting period, where the total amount of water required is 32,919 m<sup>3</sup>/sec. The dimensions of the secondary Lindu Baliase irrigation canal which flows into B.Tk 1 are planned with an average base width of 1.50 m, for B.Tk 2 it is 1.45 m, for B.Tk 3 it is 1.40 m, then for B.Tk 4 it is 1.30 m, for B.Tk 5 it is 1.10 m, for B.Tk 6 it is 0.80 m, then for B.Tk 7 it is 0.60 m and finally for B .Tk 8 is 0.40 m and the channel height

at B.Tk 1 is 0.87 m, for B.Tk 2 it is 0.84m, for B.Tk 3 it is 0.83 m, then for B.Tk 4 it is 0.79 m, for B.Tk 5 it is 0.75 m, for B.Tk 6 it is 0.60 m, then for B.Tk 7 it is 0.60 m and finally for B.Tk 8 it is 0.35 m. Then for B.Tk 1 the flow rate is 1.36 m<sup>3</sup>/s, for B.Tk 2 it is 1.19 m<sup>3</sup>/s for B.Tk 3 it is 1.12 m<sup>3</sup>/s, then for B.Tk 4 it is 0, 93 m<sup>3</sup>/s, for B.Tk 5 it is 0.72 m<sup>3</sup>/s, for B.Tk 6 it is 0.31 m<sup>3</sup>/s, then for B.Tk 7 it is 0.27 m<sup>3</sup>/s and finally for B. TK 8 is 0.05 m<sup>3</sup>/sec.

Paper ID : 363

**THE EFFECT OF CHANGES IN LAND USE AND RAINFALL  
ON FLOOD DISCHARGE IN BATANG WATERSHED IN  
2012 AND 2022**

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Abstract - The Batang Watershed is located in Kalidoni District and is one of the watersheds that frequently experiences flooding in Palembang. Kalidoni District had a population of 126,207 people in 2021 with an area of 27.92 km<sup>2</sup> and is a flood-prone area with a high classification. This research aims to analyze the flood discharge of the Batang watershed in Palembang City using the Rational method based on changes in land use and the amount of rainfall that occurred in 2012 and 2022. The results of the analysis of flood discharge in the Batang watershed have increased from 2012 to 2021. Factors the leading cause of the increase in discharge is high rainfall, with a value of 144.33 mm in 2012 and 168.68 mm in 2022. Changes in land use in the Batang watershed in the form of residential buildings and roads have significantly increased. However, land use in the form of Paddy fields and fields also experienced a significant increase, so many catchment areas are still available in the Batang watershed. The results of the flood discharge analysis with a return period of 10 years showed an increase in flood discharge of 33.01%; the flood discharge in 2012 was 22.23 m<sup>3</sup>/s, and in 2022 it was 29.68 m<sup>3</sup>/s.

Paper ID : 364

## **ANALYSIS AND EVALUATION OF DRAINAGE CHANNEL ON MUSI V BRIDGE, GANDUS DISTRICT, PALEMBANG**

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Abstract - Musi V Bridge is one of 3 bridges on the Kayu Agung-Palembang-Betung toll road. Musi V Bridge is the longest toll bridge in Indonesia, connecting the cities of Palembang and Betung with a length of 1,684 km and a width of 17 m located in Gandus District, Pulokerto Village, Palembang city. Now, the construction stage of this bridge has reached almost 70 percent, so it is necessary to do planning efficiently so that this development can be a profitable investment for the Indonesian state, including planning analysis and evaluation of drainage on the Musi V bridge. The analysis was carried out with rainfall data obtained from BMKG Station, some of which were obtained from the Kertapati post, and some were obtained from the SMB II station post. Then, the data was processed in frequency analysis and match tests so that the parameters of Concentration Time and Hydrological Discharge are obtained, which will later be compared with hydraulic discharge processed from channel dimension parameters in the field. The results of the drainage channel analysis show that several channels have the potential for inundation due to the inappropriate slope of pipe installation. The diameter of the 6-inch PVC pipe field is unable to accommodate hydrological discharge. In contrast, in the evaluation results, the planning diameter is assumed to be 8 inches or 20.32 cm by the guidelines, which say the minimum channel diameter is 200 mm or 20 cm, and with a minimum

pipe installation slope of 2% for Ease of maintenance shows the results that in 53 drainage channels, all are suitable or suitable for use according to the ratio of hydraulic discharge able to accommodate hydrological discharge.

Paper ID : 369

**THE EFFECTS OF  $\text{Na}_2\text{SiO}_3$  AND  $\text{NaOH}$  RATIO ON  
SULPHATE RESISTANCE OF GEOPOLYMER MORTAR  
WITH FLY ASH AND OIL PALM SHELL PRECURSOR**

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Abstract - A geopolymer mortar is a mortar with a binder that does not fully use cement as a binder but uses a precursor as a substitution, which has a high silica and alumina content. This study is about the effects of  $\text{Na}_2\text{SiO}_3$  and  $\text{NaOH}$  ratio on the sulfate resistance of geopolymer mortar with fly ash and oil palm shell precursor. The proportions of fly ash and oil palm shell ash were 75:25, 50:50, and 25:75. The ratios of  $\text{Na}_2\text{SiO}_3$  and  $\text{NaOH}$  14 M used were 1.5, 2.0, and 2.5 with 5x5x5 cm cubical test objects. This study used fine aggregate and precursor ratio of 2.75: 1 and on the manufacturing process through a rest period for 24 hours and curing at a temperature of 80° C for 24 hours, then curing at room temperature for 28 days. The test process of the sulfate resistance was by immersing the test object in  $\text{Na}_2\text{SO}_4$  solution of 5% concentration for 28 days to determine the mass changes, the decreased compressive strength, and the microstructural changes that occurred in geopolymer mortar. The results showed that the material composition of 75% fly ash: 25% oil palm shell, and  $\text{Na}_2\text{SiO}_3$  and  $\text{NaOH}$  ratio of 2.5 were the optimum compositions that have the highest compressive strength compared to other material compositions against sodium sulphate attack.



Paper ID : 370

## **PHYSICAL AND MECHANICAL PROPERTIES OF MORTAR WITH THE MIXTURE OF PAPER MILLS WASTE**

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**Abstract** - A The growth of the industrial and construction sectors continues to increase every year. In construction, the primary material used is concrete. Concrete is composed of cement, aggregate, and water. However, 8% of CO<sub>2</sub> emissions in the world come from the cement manufacturing process. In the industrial sector, the paper industry produces the most waste, around 48 tons of waste for every 100 tons of pulp produced. The primary wastes of the paper industry include slaker grits, dregs, lime mud, and fly ash. Research has been conducted to address this problem by modifying concrete mix materials by utilizing paper mill waste. Fly ash is used as a substitute for cement, and grits are used as a substitute for fine aggregate. From the research, it was found that the density value decreased with increasing fly ash mixture and the compressive strength value of mortar with variations in the addition of 0%, 10%, 20%, 30%, 40%, and 50% fly ash respectively were 7.42 MPa, 6.68 MPa, 6.18 MPa, 4.97 MPa, 3.93 MPa, and 2.97 MPa. The decrease in density and compressive strength with increasing fly ash is due to the less adhesive power of waste compared to cement due to its lower CaO content. The value of compressive strength samples 1, 2, and 3 belong to the N-type, which can be used as load-bearing walls, and samples 4, 5, and

6 fall into type O, which can be used as non-load-bearing and decorative walls in accordance with SNI 03-6882-2014 standards.

Paper ID : 371

**SPATIAL CHARACTERISTICS VISUALIZATION OF  
TRANSFER POINT INFRASTRUCTURE IN THE CITY OF  
PALEMBANG**

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**Abstract** - The government's efforts to increase public transport users in Palembang are by providing public transport such as LRT, Teman Bus and LRT feeder Musi Emas. The previous research, show that there are still deficiencies in public transport services. The condition of physical integration between public transport, such as no bus stop, inadequate sidewalk facilities and even in some locations they are not available, no crossing bridges, no lighting, no information on routes, schedules and several other things. Based on these conditions, this research will conduct a study of physical integration between public transport modes by visualizing the spatial characteristics of transit points facilities in Palembang City. The method used for visualization is a mapping model using GIS 10.8 application. The results of this research show that the districts with the most transfer points in Palembang is Ilir Timur I and Alang-Alang Lebar which have LRT station, bus stops and river mode infrastructures. The results of this research can be used as a reference for improving public transport physical integration in Palembang in areas served by public transport. The visualization results of transfer points users in Palembang have shown that Ilir Barat I and Sukarame Districts have the the highest users of transfer points infrastructure LRT station. Based on this

research, it is known that the availability of transfer points infrastructure is not necessarily accompanied by a high number of public transport users in one sub-district when compared to other sub-districts. This is partly due to inadequate condition of physical integration between public transport.

Paper ID : 376

**STUDY OF RETENTION TIME VARIATION ON  
CONSTRUCTED WETLAND PERFORMANCE FOR  
KITCHEN WASTEWATER TREATMENT**

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Abstract - Constructed wetlands are intentionally created systems designed to emphasize specific characteristics of wetland ecosystems to improve landscape, retain stormwater, and enhance its quality. The application of this system has been widely used in several countries as this system is low-cost and sustainable. The treatment performance of constructed wetlands critically relies on the optimal operating parameters, including hydraulic retention time. This prompted the implementation of this study to analyze the effectiveness of retention time variation on constructed wetland performance for domestic wastewater treatment plant. The design of the constructed wetland in this research uses Free Water Surface (FWS) or Surface Flow (SF) system using sand, gravel, and water hyacinth. Domestic wastewater from a local restaurant was used as the sample for this research. The initial kitchen wastewater concentration from the restaurant does not meet the effluent standard by the Ministry of Environment and Forestry Regulation No.68/2016. Data analysis shows a significant decrease in all pollutant parameters after 24 hours of retention time. The initial condition of BOD 1931 mg/L has been reduced to 25.12 mg/L with 98.69% efficiency. The initial condition of TSS 1200 mg/L has been reduced to 29 mg/L with 97.58% efficiency. The oil and

grease concentration of 227.5 mg/L has been reduced to 1 mg/L with 99.5% efficiency. At the same time, the initial condition of COD 1356 mg/L has been reduced to 73.29 mg/L with 94.6% efficiency.

Paper ID : 377

**FLOOD MAPPING USING HEC-RAS AND GIS; A CASE  
STUDY OF PALEMBANG WATERSHEDS**

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Abstract - Flooding is a significant issue in Palembang City, affecting areas such as Gandus, Lambidaro, Boang, Sekanak, Bendung, Kidul, Buah, Juaro, Selinca, Nyiur, Aur, Sriguna, Kedukan, Keramasan, Kertapati, and Jakabaring watershed. This research contributes to flood control measures by providing flood mapping and modeling for decision-makers and local authorities. There are three processes involved in the data analysis: hydrological, hydraulic, and spatial. The calculation of average rainfall is performed using the Isohyet method with the assistance of the IDW 3D Analyst tool in ArcGIS, and the design discharge is calculated using the HSS Nakayasu method. The hydraulic analyses involve river morphology extraction using RAS Mapper tools in HEC-RAS. Steady flow simulations are conducted for normal water depth conditions and the highest tidal conditions. The simulation result is then reclassified, and the flood location points are verified with observed data. For normal water depth conditions, the maximum water level in the Lambidaro watershed reaches 2,09 meters, which covers a flood area of 721,53 ha. Meanwhile, based on the highest tidal simulations, the maximum water level in the Selinca watershed reaches 3,21 meters, covering a flood area of 209,36 ha.

Paper ID : 378

## **EXPERIMENTAL STUDY OF ASBUTON GRANULAR COLUMN USE WATERGLASS AS STABILITY MATERIAL**

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Abstract - Asbuton minerals generally consist of limestone bedrock. Asbuton deposits in large quantities can guarantee the supply of construction needs. Asbuton is also widely used in soil improvement. However, in some cases, Asbuton has a low compressive strength. The availability of basic materials and stabilization materials is the main factor for the authors to carry out chemical stabilization of Asbuton, using Waterglass to obtain new Asbuton stabilization innovations. Stabilization is done by using sand and gravel as filler and Waterglass serves as a binder. Waterglass replaces water completely. Samples were tested at 0, 3, 5, and 7 days ripening period in the form of CBR specimens, Column Elements and Floating Foundation Physical Model Test. The test results show that the gradation of the granular material, the percentage of waterglass and the curing period significantly affect the mechanical value. The test results prove that granular columns with asbuton substitution and the addition of waterglass can be an alternative to artificial columns in order to overcome the problem of soft soil.



Paper ID : 382

**THE PERFORMANCE-BASED ANALYSIS OF BUILDING  
STRUCTURE ON VARIATIONS IN CONCRETE QUALITY  
AND EARTHQUAKE ZONE**

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Abstract - Indonesia is an active seismic country with a high frequency of earthquakes. The greatest impact of earthquake disasters is the loss of life caused by the collapse of buildings. Therefore, attention to the design and implementation of building structures resistant to earthquake loads must be taken seriously. The government has made a serious effort in this regard by changing the earthquake load calculation standards from SNI 1726-2012 to SNI 1726-2019. The main objective in terms of strength and seismic performance sufficient for structural requirements is achieved by dimensioning, volume, and material quality. The study examined how variations in concrete quality in buildings located in low, moderate, and high seismic areas affect the building performance. The structure was modeled as a uniform ten-story moment-resisting frame located in the cities of Palembang, Jakarta, and Palu, which represent the low, moderate, and high seismicity zones, respectively. The structural elements were analyzed with seismic load based on SNI 1726-2019 using the SAP 2000 structural analysis program with uniform dimensions and varying concrete quality specifications of 30 MPa, 40 MPa, and 50

MPa. The results of the structural performance analysis showed shear force values of 311.41 tons, 387.44 tons, and 492.06 tons for the cities of Palembang, Jakarta, and Palu. The maximum lateral deviation (i) in the X and Y directions is 156.78 mm for the PL30 model. The minimum lateral deviation is 67.30 mm for the PG50 model. The results of nonlinear pushover analysis at the performance point indicated that the largest displacement in the X and Y directions was 194.79 mm for the PL30 model and the smallest was 70.83 mm for the PG50 model. Based on the results of the displacement at the point of performance, it was found that all models tested had a level of Immediate Occupancy. Based on the analysis of the structural response and structural performance for the design and dimensions of the same structural elements, the optimal quality of concrete that can be used for Palembang is 30 MPa and Jakarta is 50 Mpa. Meanwhile, the city of Palu still needs to be redesigned by improving concrete quality, changing dimensions, or other methods of strengthening structures.

Paper ID : 383

**THE PERFORMANCE COMPARISON OF DUAL SYSTEM  
AND SPECIAL MOMENT-RESISTING FRAME  
STRUCTURES AGAINST EARTHQUAKE LOADS BASED  
ON SNI 1726: 2019**

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Abstract - Changes in land use affect the amount of runoff that can seep into the soil. This problem can be found in Perumahan Dosen UNSRI. This can be overcome by rainwater management such as Infiltration Trench and Rain Water Harvesting. This study aims to analyze the best scenario for rainwater treatment in the research area to reduce excess runoff that occurs. Daily rainfall data, land use, soil permeability, land measurements, and existing drainage dimensions are used in the algorithm analysis. Determining the effective scenario is done by analyzing the algorithm and taking into account the BEP. The scenario which includes an infiltration trench with a depth of 1 m and an RWH system with a tank volume of 2 m<sup>3</sup> has the greatest average effectiveness of 55.33%, when compared to the scenario with an infiltration trench with a depth of only 1 m. Furthermore, the RWH system brings an additional effectiveness of 23, 94%. Compared to the contrary, the addition of an infiltration trench only increased the effectiveness by 18.4%. The total cost of implementing the infiltration trench is 2 times that of the RWH system based on the calculation of

the budget estimate plan. Accordingly, the best scenario is determined, namely the implementation of a RWH system with a tank of 2 m<sup>3</sup> in volume. This scenario has an average runoff reduction effectiveness value of 37.05% from the 3 years daily rainfall data used and a total cost of 1.8 billion Rupiah for all 194 houses

Paper ID : 385

**PERFORMANCE ANALYSIS OF RAINWATER  
MANAGEMENT USING RAINWATER HARVESTING AND  
INFILTRATION TRENCH SYSTEMS IN PERUMAHAN  
DOSEN UNSRI KELURAHAN BUKIT LAMA**

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Abstract - Changes in land use affect the amount of runoff that can seep into the soil. This problem can be found in Perumahan Dosen UNSRI. This can be overcome by rainwater management such as Infiltration Trench and Rain Water Harvesting. This study aims to analyze the best scenario for rainwater treatment in the research area to reduce excess runoff that occurs. Daily rainfall data, land use, soil permeability, land measurements, and existing drainage dimensions are used in the algorithm analysis. Determining the effective scenario is done by analyzing the algorithm and taking into account the BEP. The scenario which includes an infiltration trench with a depth of 1 m and an RWH system with a tank volume of 2 m<sup>3</sup> has the greatest average effectiveness of 55.33%, when compared to the scenario with an infiltration trench with a depth of only 1 m. Furthermore, the RWH system brings an additional effectiveness of 23, 94%. Compared to the contrary, the addition of an infiltration trench only increased the effectiveness by 18.4%. The total cost of implementing the infiltration trench is 2 times that of the RWH system based on the calculation of

the budget estimate plan. Accordingly, the best scenario is determined, namely the implementation of a RWH system with a tank of 2 m<sup>3</sup> in volume. This scenario has an average runoff reduction effectiveness value of 37.05% from the 3 years daily rainfall data used and a total cost of 1.8 billion Rupiah for all 194 houses.

Paper ID : 398

**ENVIRONMENTAL EFFECTS OF REFINED PALM OIL  
(RPO) ON CONCRETE MIXES**

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**Abstract** - This study aims to examine the properties of aggregates used in the manufacture of concrete in RPO baths, examine the mechanical properties of concrete, namely compressive strength, flexural strength and porosity in concrete in the RPO environment. This research uses concrete experiments in RPO baths with 3 combinations and 2 types of concrete plan ages, then analyzed in the laboratory. The parameters measured were changes in aggregate weight, porosity, flexural strength and compressive strength of concrete. The results showed that the higher the percentage of RPO immersed in concrete, the lower the compressive strength, flexural strength and porosity of the concrete. The change in weight of coarse aggregate immersed in RPO until 56 days old does not affect the weight of the coarse aggregate, while the change in weight of fine aggregate immersed in RPO until 56 days old does not affect the weight of the fine aggregate.

Paper ID : 408

## **ANALYSIS OF THE LEVEL OF TRAFFIC FLOW SERVICE ON JALAN SULTAN HASANUDDIN PINRANG REGENCY**

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Abstract - Jalan Sultan Hasanuddin is a road in Pinrang Regency which has a relatively narrow road, plus heavy traffic with strong construction buildings beside the road. The purpose of this research is to determine the performance of the Jalan Sultan Hasanuddin section regarding the ability to carry out its functions and the feasibility of the road and traffic engineering on the performance of traffic on Jalan Sultan Hasanuddin. Analysis of the Sultan Hasanuddin road was carried out by collecting primary data and secondary data. Primary data is data collected from the research site. Meanwhile, secondary data is complementary data obtained by searching for data from agencies related to the analysis. Based on the research results, it was found that the traffic volume on Sunday afternoons at 16.00 – 17.00 WITA with a peak hour volume of 348.45 pcu/hour, the travel speed at the study location. Where the average travel speed on Monday at 07.00 – 08.00 is 2.1108, at 12.00 – 13.00 is 2.4253 and at 17.00 – 18.00 is 2.0757, the capacity (C) on the Jalan Sultan Hasanuddin section is 1,312 pcu / hour, the degree of saturation on the Jalan Sultan Hasanuddin section is 0.27, and the level of road service (Los) is 0.29 which is in the category. The level of service is in the category of road surface class B = 0.29 (0.01-0, 7). Illustration of Traffic Engineering to reduce congestion and vehicle volume density, create one-way



roads and prohibit entry signs at intersections and parking markings on the left and right sides of the median road.

Paper ID : 410

**ANALYSIS OF HAZARD, VULNERABILITY AND  
DROUGHT RESISTANCE FOR DROUGHT MODEL  
DEVELOPMENT IN OGAN KOMERING ILIR DISTRICT**

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Abstract - Indonesia has a tropical climate with high-temperature that results in high evaporation, but it also has the potential to rain. One of the extreme phenomena that occur in Indonesia is drought. Indonesia experiences extreme drought three to four times a year. South Sumatra Province, especially Ogan Komering Ilir (OKI) Regency, is dominated by swamp land and a type of peat soil with high vulnerability to drought and can even trigger forest fires. This research was conducted to determine the levels of hazard, vulnerability, and resilience in each region of the OKI District. This study used a literature study and an interview method by distributing questionnaires. The questionnaires were distributed randomly to 36 respondents from the OKI Regency community. Analysis of drought hazard and vulnerability data is based on rainfall, soil type, land use, social vulnerability, economic vulnerability, and environmental vulnerability. Drought resilience analysis is based on the factors of community knowledge, the use of rivers as a source of water, community activity, savings ownership, and the role of government. Based on data analysis results and processing, the Districts of Cengal, Jejawi, Pampangan, and Pangkalan Lampam were determined as MODERATE in the hazard and vulnerability category. Meanwhile,

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the analysis results of drought resistance in OKI Regency was only around 45.83%. These results indicate that OKI District does not yet have sufficient resilience when dealing with the drought that occurred.

Paper ID : 411

**SIMULATION OF ONE DIMENSIONAL DAM BREAK  
MODEL IN OPEN CHANNEL USING FINITE DIFFERENCE  
NUMERICAL METHOD**

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Abstract - Dams are hydraulic structures that have a high risk of natural disasters. This can be caused by several factors such as overflow, foundation defects, or leakage. Mitigation efforts are carried out through various methods including mathematical modeling of dam break scenarios. This mathematical modeling is performed to evaluate the fluid flow that occurs and analyze the likelihood of a disaster. The Shallow Water Equations, derived by Adhemar Jean Claude Barre de Saint-Venant, are the general equations used in mathematical modeling of dam break scenarios. These equations are solved using superior numerical methods in terms of computation, such as the Finite Difference Method with Collocation Grid (Crowhurst-Li FDM), Lax-Friedrichs method, and MacCormack method. These numerical methods can be performed using MATLAB programs. The output obtained includes water surface elevation and fluid velocity graphs. It was found that the MacCormack finite difference method provided more accurate results in solving dam break scenarios.

Paper ID : 416

## **IDENTIFICATION OF ANTHROPOGENIC FACTORS IN FLOOD EVENTS IN PALEMBANG CITY**

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Abstract - Palembang City is a lowland area, with elevations starting from 4 m above sea level, and has high rainfall and rainy days. Thus, Palembang City is very vulnerable to flooding and/or inundation. As a result of flooding and/or inundation, combined with poor sanitation, diarrhea, tuberculosis, and pneumonia often occur in Palembang City. This research is preliminary quantitative descriptive research. Field surveys are carried out by looking directly at the field and conducting interviews with local residents to obtain data: location, causes of flooding or inundation, availability and condition of drainage, as well as characteristics of flooding that occurs. The results of the study show that flooding and/or inundation occurred in unexpected areas, in sub-district areas that experienced an increase in residential areas. Other anthropogenic factors include domestic wastewater that enters the drainage channel, filling in wetlands, flooding from other areas, overflow of retention ponds, and buildings covering the drainage channel. This research found that flooding or inundation is not only caused by natural factors but also by anthropogenic factors, especially caused by insufficient channel capacity, solid waste/others that obstruct the flow of channels or rivers, and drainage networks that do not exist or are connected. Further research is needed regarding the

relationship between residential growth in an area and the incidence of flooding and/or inundation.

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Paper ID : 277

**PERFORMANCE ANALYSIS OF MICROSTRIP ANTENNA  
MIMO FREQUENCY BAND N40 WITH BAVELED-  
HALFCUT METHOD FOR LTE TECHNOLOGY**Didik Aribowo<sup>2,\*</sup>, Zainuddin Nawawi<sup>1</sup><sup>1</sup>Universitas Sriwijaya, Indonesia<sup>2</sup>Universitas Sultan Ageng Tirtayasa, Indonesia

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Abstract - The development and innovation of telekomunikasi in the field of wireless technology has not been a topic of interest. The evolution of analog (1G) to 4G has led to the development of wireless technologies, such as MIMO and VSWR. Antenna is a crucial component in the development of wireless technology, as it plays a crucial role in enhancing the performance of a network. The proposed structure of antenna is based on the MIMO 2x2 architecture, which includes a conventional antenna (CCSA), a CSBA, and a MIMO CBSA. The antenna consists of a substrat FR4 with a 4.6mm h-bandwidth and a loss of 0.025. The combination of antenna circular and half-cut method ensures a wide bandwidth with a returnloss (S1.1) of -24.86583 dB at 5.39 GHz, VSWR of 1.211371 < 2, and result gain of 2.53 dB at 3.1 GHz and 1.31 dB at 26 GHz.

Paper ID : 294

**IOT-BASED REMOTE MONITORING SYSTEM FOR  
WASTE POWER PLANT INSIDE CAMPUS AREA OF  
NATIONAL INSTITUTE OF TECHNOLOGY MALANG**

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Abstract - A *micro-scale waste power plant* is an innovative solution for generating electricity from organic waste. However, effective monitoring and control is required to ensure optimal performance and efficient management of these power plants. This system consists of several sensors installed in a power plant connected to the Internet network. These sensors collect data such as temperature, pressure, current, voltage, power, energy and frequency generated by the power plant. In designing this system, we use the ESP8266 microcontroller and Arduino Uno as the brains of this system. The data that has been read by the PZEM 004t, WZPT PT100 and XIDIBEI XDB305 sensors will be processed by the microcontroller and then sent via the internet network to the HTTP communication protocol to transmit data online. It is hoped that the results of this thesis can contribute to the development and application of IoT technology in the management of micro waste power plants. This system has the potential to improve operational efficiency and energy sustainability at ITN Malang Campus II and can be adapted for use in similar contexts elsewhere.

Paper ID : 304

**PERFORMANCE COMPARISON OF REGURGITATION  
MITRAL VALVE DISEASE SEGMENTATION USING  
CONVOLUTIONAL NEURAL NETWORK**

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Abstract - Segmentation divides images into simpler ones to make the analysis process easier, by separating objects that are not analyzed into the background and objects to be analyzed into the foreground. Segmentation can help simplify image analysis and help speed up disease detection. In analyzing medical images, the use of semantic segmentation has been widely applied in analyzing or detecting disease. In developing countries, heart valve disease is still a deadly disease and around 80% of the general population suffers from mitral heart valve disease. In this study, heart valve image analysis was carried out by segmenting the mitral heart valve image. This study built a dataset from data on patients who experienced mitral

regurgitation as indicated by color Doppler. Several CNN architecture models were applied in this research to compare performance, including U-Net, U-Net, ResNet architectures. The experimental results show that the best architecture is U-Net3 in terms of Pixel Accuracy, Intersection over Union, and Dice Coefficient of 97.62%, 86.93%, and 86.51%.

Paper ID : 307

**ANALYSIS OF LEE KWAN YEW'S GREEN BUILDING  
PLANT ENERGY ON THERMAL AND HUMIDITY**

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Abstract - Green Building is one of the emerging concepts to support low-carbon development, namely through policies and programs to improve energy, water and building material efficiency and to increase the use of low-carbon technologies. Vertical gardens or vertical greenery according to (Blanc, 2008) are plants that are arranged vertically to balance the environment so as to create a specific microclimate around it. Vertical gardens can be used as an idea to make an urban environment look natural. Lee Kwan Yew plants have been widely used for vertical gardens on office walls and tall buildings to protect glass walls from sun exposure. The Vertical Greenery System has four main effects: shading, cooling, insulation and windbreak. In terms of energy saving, shadowing effect is considered as the most significant impact of the vertical greenery system. The shading effect produced by plants, which are capable of absorbing solar radiation on building surfaces, is the subject of almost all the analyzes of previous studies. In hot weather, VGS can reduce the

energy consumption of air conditioners and become a heat insulator in cold weather. If the room temperature drops by  $1^{\circ}\text{C}$ , it will reduce energy consumption by around 5.2–6.2%. In this study, the highest temperature reduction was  $1.2^{\circ}\text{C}$ , which means that the greatest reduction in energy consumption was 6.2–7.44%. The average temperature drop is  $0.3^{\circ}\text{C}$ , which means a reduction in energy consumption of around 1.56–1.92%.

Paper ID : 313

## **IMPUTATION OF MULTIVARIATE TIME SERIES DATA USING AUTOENCODER ARCHITECTURE**

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Abstract - Time series data is recorded in various application fields ranging from earth sciences to health care, finance, traffic, etc. Time series often have missing values (gaps) due to, for example, sensor failure, collection errors, or lack of resources. However, often a complete time series data set is required for analysis. There are two categories of time series missing value imputation methods, namely multivariate and univariate methods. Each form or pattern of loss produces some consequences on the ML algorithm Yes, which will be used in the future. Handling lost data properly is the thing the most important thing and special supervision must be carried out to ensure the ML method will produce accurate reasoning. Missing data may preserve valuable information on the data set. Additionally, many ML methods do not support data with missing values. In this research we will try to apply the Imputation technique with the Auto Encoder Architecture. By implementing Auto Encoder Imputation, it is hoped that we will be able to restore lost data according to the original. Because the Auto Encoder technique is to restore lost data according

to the actual initial data. Therefore, it is very suitable for recovering lost data in Multivariate time series data using Imputation Techniques with Auto Encoder Architecture.



Paper ID : 314

**DEVELOPMENT OF AN ARDUINO UNO-BASED BUOY  
TRACKING SYSTEM WITH GPS INTEGRATION**

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Abstract - The increasing demand for information in today's era underscores the necessity for fast and precise information services. One specific example is the need for location-based information. Traditionally, such information was obtained from maps, which proved to be less practical for real-time use. Hence, there is a requirement for a user-friendly, swift, and accurate positioning tool. Presently, GPS (Global Positioning System) serves as a highly accurate satellite-based positioning tool. It provides coordinates that indicate the current location. This research aims to create a system that responds to coordinate requests via SMS. The system utilizes a GPS sensor to detect buoy positions in terms of latitude and longitude coordinates. Users with cell phones can simply send an SMS with a specific format to the system, which in turn sends an SMS back to the user containing the most recent location information. Users can easily view these locations through the Google Maps application. The main components of this tool include a GPS module NEO-6M, GSM SIM 800L, and Arduino Uno microcontroller. Extensive testing was conducted under various conditions, including different distances, obstacles, weather conditions, and time variations. The design

demonstrates that by integrating GSM and GPS with the Arduino Uno board as the platform, buoy tracking can be significantly improved in terms of efficiency and convenience, as it can operate effectively in all weather conditions and offer real-time object location. The future design should incorporate the automatic display of geographical coordinates on a map.

Paper ID : 320

**DESIGN AND DEVELOPMENT OF A RASPBERRY PI  
BASED ZEBRA CROSS VIOLATION DETECTION SYSTEM  
FOR TRAFFIC LIGHTS**

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Abstract - Big cities, especially Makassar, are developing very quickly in line with the city government's vision and mission to become a Smart City. The city of Makassar has become an iconic tourist attraction, namely the 99 Cuba Mosque in the Losari Beach area, which is beautiful and cool, so that visits from tourists and foreign tourists are increasing. The extensive road infrastructure is crowded with motorbike riders who frequently violate the traffic flow, going through red lights is very dangerous without caring about their safety. Utilizing technology using a Raspberry Pi based on IoT is one solution to overcome motorists violating traffic lights, especially. Violations cause traffic jams so that community activities are hampered. This research methodology uses Research and Development (R&D), The research produces a tool for detecting zebra crossing violations via webcam cameras. The research objective is to design a Zebra Cross Traffic Light violation monitoring system based on Raspberry Pi. The test results were detecting motorists who violated the zebra crossing at the traffic light. The motorbike rider was detected violating the Zebra crossing limit. The image captured via webcam was read by the system with digital assistance. The violation is detected by the camera, the speaker sounds with an information notification sent to the traffic

officer's telegram. The conclusion of the research is the design of a Zebra Cross violation detection tool at traffic lights to maintain driver safety and obey the signs. The research objective is to design a Zebra Cross Traffic Light violation monitoring system based on Raspberry Pi. The results of the test were to detect motorists who violated the zebra crossing at the traffic light. The motorbike rider was detected to have violated the zebra crossing. The image captured via webcam was read by the system with digital assistance. The violation is detected by the camera, the speaker sounds with an information notification sent to the traffic officer's telegram. The conclusion of the research is the design of a Zebra Cross violation detection tool at traffic lights to maintain driver safety and obey the signs. The research objective is to design a Zebra Cross Traffic Light violation monitoring system based on Raspberry Pi. The results of the test were to detect motorists who violated the zebra crossing at the traffic light. The motorbike rider was detected to have violated the zebra crossing. The image captured via webcam was read by the system with digital assistance. The violation is detected by the camera, the speaker sounds with an information notification sent to the traffic officer's telegram. The conclusion of the research is the design of a Zebra Cross violation detection tool at traffic lights to maintain driver safety and obey the signs. The violation is detected by the camera, the speaker sounds with an information notification sent to the traffic officer's telegram. The conclusion of the research is the design of a Zebra Cross violation detection tool at traffic lights to maintain driver safety and obey the signs. The violation is detected by the camera, the speaker sounds with an information notification sent to the traffic officer's telegram. The conclusion of the research is the design of a Zebra Cross violation detection tool at traffic lights to maintain driver safety and obey the signs. The violation is detected by the camera, the speaker sounds with an information notification sent to the traffic officer's telegram. The conclusion of the research is the design of a Zebra Cross violation detection tool at traffic lights to maintain driver safety and obey the signs.

Paper ID : 331

**MIXED SPECTRAL ANALYSIS USING A  
CONVOLUTIONAL NEURAL NETWORK APPROACH OF  
LONG SHORT-TERM MEMORY FOR MODEL  
PREDICTION OF WATER QUALITY INDEX**

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**Abstract** - River water quality is influenced by the environment around the river flow. Industrial, household waste and all daily human activities that go directly into rivers without going through a processing or purification process first can make the Water Quality Index (WQI) score in Indonesia low. The Ministry of Environment and Forestry reported that the WQI score in Indonesia in 2022 was 53.88 points, however, this score did not meet the target of 55.03 points. There are 8 (eight) mandatory parameters as components for calculating the WQI, namely TSS concentration, pH, BOD concentration, COD concentration, DO, Total Phosphate concentration, Fecal Coliform concentration and NO<sub>3</sub>-N concentration. Previous research stated that to measure the Water Quality Index, you can use a spectral mixture analysis method based on data from Landsat 8 OLI and others using CNN and LSTM approaches. This research aims to produce a Water Quality Index prediction model using a mixed spectral analysis method and a Convolutional Neural Network of Long-Short Term Memory approach. Data was taken based on in-situ measurements per semester

from 2021 - 2023 and spectral data from Landsat 8 OLI on watersheds in North Musi Rawas Regency, South Sumatra Province.

Paper ID : 374

## **ARRHYTHMIA DETECTION USING DEEP NEURAL NETWORK CLASSIFICATION ON ECG SIGNAL**

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Abstract - Heart disease has become the leading cause of death today. Electrocardiogram (ECG) is a device used to detect the patient's heart condition. This ECG test is painless but can provide important information to diagnose the patient's heart condition. The ECG signal produced becomes a reference for health practitioners to detect heart disease. Arrhythmia refers to irregularities in the rhythm of the heartbeat. The classification of ECG signals has attracted many researchers to study in recent years. In this study, classification using deep learning has shown very good results in detecting arrhythmias. The preprocessing process is carried out using normalize bound and autoencoder. ECG signals are segmented into short signals before going into the classification section. The proposed classification method uses DNN (Deep Neural Network). Where the DNN classification method gets excellent results, namely accuracy reaches 99.8%, specificity 99.84%.

Paper ID : 406

## **THE EFFECTS OF MECHANICAL STRAIN ON THE BREAKDOWN VOLTAGE OF SILICONE RUBBER- AL<sub>2</sub>O<sub>3</sub> INSULATION WITH SURFACTANT MODIFICATION**

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Abstract - Silicone rubber (SiR) insulation offers excellent properties in high temperatures. Since the introduction of filler will enhance the properties, the addition of Alumina (Al<sub>2</sub>O<sub>3</sub>) will improve properties such as corrosion resistance, and good elasticity. Since SiR is hydrophobic, often leading to poor interaction between the two materials Prolonged use of SiR insulation can lead to its expansion (increase in length), which may result in a deterioration of insulation performance. To investigate the effects of the mechanical strain due to prolonged use of SiR in terms of high voltage endurance of breakdown voltage, this study is necessarily conducted. The SiR samples are 50 mm x 50 mm sheets with 1 mm thickness. Various Al<sub>2</sub>O<sub>3</sub> loading from 0 to 4 wt% and 0.01 g of surfactant are introduced. A needle-plate electrode with 1 cm gap was arranged for conducting the study. Mechanical strain subjected to the samples in 1, 2, and 3 cm with a conditioning duration of 60 minutes. Breakdown voltage and PDIV are measured from the experiment. The results



show an increasing trend for PDIV and a decreasing trend for breakdown voltage with the addition of the filler and the rising time of mechanical strain. These results can be attributed to partial damage to the insulation, particularly in areas subjected to mechanical stress.



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Paper ID : 274

**STUDY OF THE EFFECT OF AERATION ON THE  
BIOLOGICAL TREATMENT OF PULP AND PAPER  
INDUSTRY WASTEWATER WITH PETROPHILIC  
BACTERIA**

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**Abstract** - The pulp and paper industry is one of the largest freshwater resource user industries operating worldwide. At least 80% of process wastewater from papermaking operations includes, ammonia, chemical oxygen demand (COD), total suspended solids (TSS) and other organic matter. Therefore, it is very necessary to treat pulp wastewater properly so as not to cause environmental pollution. In this study, microbiological processing of primary wastewater from the pulp industry was carried out using one type of petrophilic bacteria, namely *Brevendomonas diminuta*. This study tested the ability and effectiveness of bacteria in degrading ammonia, COD and TSS content with aeration variations of 0 L/min, 2.25 L/min and 4.5 L/min. The observation time on the samples was carried out at 4; 6; 8 hours. Analysis of the ammonia content in the samples showed that the optimum reduction time was 6 – 8 hours with 4.5 L/min aeration which reached 64%. Optimal COD reduction analysis of 90% occurs at aeration variation of 4.5 L/min with an observation time of 8 hours. Analysis of the TSS content found that optimal degradation reached 76% occurring at 4.5 L/min aeration with an observation time of 6 hours. The results prove that petrophilic bacteria are able to degrade

the liquid waste content of paper pulp under the appropriate processing conditions and the optimum supply of aeration rate and time.

Paper ID : 283

**PHENOL CONCENTRATION IN LIQUID SMOKE  
PRODUCTION FROM RUBBER WOOD BY EXPERIMENT  
AND SIMULATION WITH CFD MODELING**

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Abstract - Liquid smoke is the result of condensation from the pyrolysis process of rubber wood without the help of oxygen. One of the dominant contents of liquid smoke products is phenol. This study focused on the molar concentration of the simulated liquid smoke and the comparison between the experimental and simulated molar concentrations of liquid smoke. The simulation used is Ansys Fluent 19.2. Fluent is one of the Computational Fluid Dynamics (CFD) programs that uses the finite volume method in its solution. There are several stages in completing the Ansys simulation, namely, pre-processing, meshing, processing, and post-processing. The geometry displayed in this study is a 2-dimensional pyrolysis reactor. The assumption used in the simulation is to use lignin as raw material, flowrate, and pyrolysis time. Based on the reaction mechanism, lignin in the pyrolysis process produces a phenol of 4.52%. In the final stage, quantitative data simulation results are obtained in the form of molar concentrations produced from liquid smoke products. The molar concentrations in the simulation were 0.00183512, respectively; 0.0017854; 0.00170856; 0.0017628; and 0.00166788 kmol/m<sup>3</sup>. The

experimental molar concentration results show the same pattern as the simulated molar concentration results. At 4 hours of pyrolysis, the molar concentration of phenol increased so that it became liquid smoke with the best quality. A comparison of the molar concentration of liquid smoke from the simulation and experiment has a difference of 0.005%.



Paper ID : 326

**EXTRACTION AND CHARACTERIZATION OF ZINC  
OXIDE NANOPARTICLE FROM GALVANIZED WASTE  
INDUSTRY : PHYSICAL AND ANTIBACTERIAL  
PROPERTIES**

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**Abstract** - The objective of this study was to extract zinc oxide from galvanized industrial waste and subsequently characterize the physical, morphological, and antibacterial properties of the resulting ZnO nanoparticle product. The purpose of this study was to investigate the impact of different temperatures ranging from 80 oC to 120 oC and varying concentrations of hydrochloric acid from 1 M to 3 M on the extraction process of zinc dross to zinc oxide over a period of 4 hours. The zinc oxide product, which initially had a micron-sized scale, was subsequently transformed into nanoparticles with a diameter of 75 nm. This reduction in size was achieved through the application of the ultra-sonication method, utilizing an irradiation sonicator and water as the solvent. The zinc oxide that was obtained was subjected to characterization and analysis in order to determine

its purity. This was accomplished through the utilization of Energy Dispersive X-ray Spectroscopy (EDX). Additionally, the yield of the product was quantified using the gravimetric method. The measurement of morphological characteristics and size was conducted using a particle size analyzer and a Scanning Electron Microscope, respectively. The obtained zinc oxide samples were also subjected to testing in order to evaluate their capacity to hinder the proliferation of *Alcaligenes faecalis* bacteria, which are decay-causing bacteria commonly found in protein-rich food items. The findings of the study indicate that zinc oxide can be synthesized from galvanized waste. The optimal operating conditions were determined to be a temperature of 120°C and a hydrochloric acid concentration of 3 M. Under these conditions, a yield of 95.1% and a zinc oxide purity of 92.10% were achieved. The process of reducing the size of zinc oxide nanoparticles to 75 nm demonstrated an optimal time of 65 minutes. The findings from the antibacterial assay, which involved a 24-hour exposure period and a 40% concentration of zinc oxide, indicated that zinc oxide exhibited inhibitory effects on the growth of *Alcaligenes faecalis* bacteria. The inhibitory power of zinc oxide was measured to be 41.02%. The findings suggest that zinc oxide derived from zinc has the potential to serve as a viable chemical substitute for food packaging purposes.

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Paper ID : 330

**TRANS-ESTERIFICATION OF CATFISH TALLOW WASTE  
WITH ETHANOL BY ELECTROLYSIS PROCESS USING  
COPPER ELECTRODES AND KOH AS CATALYST**

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Abstract - Consumption of fuel energy continues to increase every year. Still, the fuel used today is almost entirely derived from fossil materials that are toxic to the environment and not renewable, so they need renewability to be guaranteed. One solution to this problem is ethyl ester based on catfish fish tallow waste. The catfish fish tallow is extracted first and then in a liquid phase and then reacted with the help of a KOH catalyst (1%, 1.5%, 2%) by electrolysis method using copper electrodes with a transesterification reaction. The research was conducted on the ratio of raw materials to ethanol of 1:5, 1:6, and 1:7 with a power supply voltage of 20V and 30V. It can be seen from the research results that the mole ratio of raw material and ethanol at 1:6 produces ethyl esters with a tendency to be of better quality. The best ethyl ester yield was obtained at a ratio of 1:6 raw material and 1.5% catalyst amount, and the resulting yield was 92.4058%.

Paper ID : 334

**ENDOSULFAN AS POTENTIOMETRIC SENSOR IN A  
KINETIC MODEL OF MOLECULARLY IMPRINTED  
POLYMER (MIP)**

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Abstract - Indonesia is an agrarian country with plenty of farmland and plantation area. The use of pesticides and herbicides to control plant pests is intricately tied to plant management and care. Pesticides and herbicides are active chemical agents used to control plant pests that can pollute the environment if their prevalence surpasses environmental and human tolerance limits. Pesticides and herbicides containing endosulfan components should be handled cautiously to avoid unintended outcomes that might harm people and the environment. This research aims to develop Molecularly Imprinted Polymer (MIP) endosulfan pollutant sensors to assess the kinetics of MIP adsorption to endosulfan analyte. The Freundlich Isotherm is the best endosulfan MIP adsorption kinetics model, with an AT value of  $1.79 \times 10^7$  L/mg, a (Constant linked to heat of sorption) value of  $6 \times 10^{-8}$  J/mol, and b (Freundlich Isotherm constant) of  $4.13 \times 10^{10}$ . The obtained distribution coefficient (R<sub>2</sub>) is 0.9768. Compared to the Langmuir and Freundlich isotherm models, the coefficient value of this distribution is more extensive.

Paper ID : 348

**REMOVAL OF CHROMIUM (VI) FROM AQUOUS  
SOLUTION USING BENTONITE: THE EFFECT OF  
ADSORBENT DOSE ON CHARACTERISTIC, ISOTHERM  
AND KINETIC STUDY**

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Abstract - Cr (VI) is one type of heavy metal derived from industrial waste of steel, textile, tanning, photography, dyes, explosives, matches, and fuel mobilization. Cr (VI) is highly toxic to humans and animals and even a carcinogen. Bentonite is a raw material that is widely found in Indonesia. There have been many studies on the use of bentonite as an adsorbent, but none have been used to absorb Cr (VI). The aim of this research is to find out the effect of adsorbent dose variations on characteristics, percent removal, isotherms, and kinetics to Cr (VI) adsorption from aqueous solution. Adsorbent dose varied from 10 g/L to 30 g/L with contact times of 0 to 80 minutes. Analysis of bentonite morphology by using scanning electron microscope (SEM). Bentonite characteristics like fine lumps of different sizes and there were no visible pores. The best removal of Cr (VI) is 96.5% at a dose of 20 g/L and a time of 60 minutes. Isotherms follow Langmuir and kinetics fit to first order. These results show that the bentonite effective to remove Cr (VI) from aqueous solution and worthy for further develop

Paper ID : 355

**ECO-FRIENDLY LIQUID FERTILIZER MADE FROM  
TEMPEH WASTEWATER AND ITS UTILIZATION ON  
CHILI GROWTH**

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Abstract - Liquid Organic Fertilizer is a type of fertilizer produced from organic materials. In this study, tempeh liquid waste was used as the main organic raw material. The use of this organic fertilizer is eco-friendly by utilizing tempeh wastewater and the application product is useful for plant growth. This study aims to make liquid organic fertilizer and to utilize the fertilizer for chili growth. The fertilizer made from tempeh wastewater by using brown sugar as a substrate and EM4 as bio activator. The variables observed were the differences in the volume of EM4, namely the POC-A (100 mL), POC-B (125 mL), and POC-C (150 mL). The quality of the liquid organic fertilizer produced is determined based on the content according to SNI 19-7030-2004. Product of liquid fertilizer was tested the N, P and K levels compared to commercial and chitosan fertilizer. This research method is an experimental method with 6 types of fertilizer and 2 plants media as a comparison (polybag and soil media). Data was taken by measuring height of the stem and number of leaves of the chili plant. The results showed composition of N ranged 0.0169-0.1100%, P ranged 0.0137-0.6600% and K ranged 0.1660-5.5005% K. The

highest average value for chili growth obtained from the utilization of POC-A with polybag planting media.

Paper ID : 372

**THE CHANGE IN THE CHEMICAL PROPERTIES OF  
ARABICA COFFEE AFFECTED BY THE ROASTING  
DEGREE**

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Abstract - The roasting process affects the sensory and nutritional quality of a cup of coffee. This study was intended to evaluate changes in the bioactive and physicochemical components of Arabica coffee originating from Semendo, Indonesia. The roasting degrees were based on the final temperatures (225°C = light roast, 230°C = medium roast, and 235°C = dark roast) using an industrial rotary drum roaster. Total Phenols, Flavonoids, Caffeine, antioxidant activity, pH, and color of roasted coffee were evaluated. The results showed that the roasting degree positively correlated to the bioactive compound and antioxidant properties. A significant increase in antioxidant activity was evaluated in medium and dark-roasted coffee beans. All roasted coffee has similar FTIR spectra but with different intensities. The use of FTIR spectra and principle Component Analysis successfully separated the coffee samples based on their roasting degree.







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Paper ID : 273

## **ANALYSIS THE EFFECT OF TORTUOSITY OF FORCE CONVECTION ON POROUS HEATSINK**

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**Abstract** - This research aimed to analyze the effect of tortuosity Force Convection on Porous Heatsink. The study employed Computational Fluid Dynamics (CFD) methodology to model airflow and the distribution of temperature, velocity, convective heat transfer coefficient, and Turbulence Kinetic Energy (TKE) in heatsinks with varying tortuosity levels. The study found that tortuosity has a positive linear relationship with the heatsink surface area and pressure drop, but a negative linear relationship with the overall predicted surface heat transfer coefficient using linear regression. As tortuosity increases, the surface area increases from 9298.48 to 12711.93 mm<sup>2</sup>, and the pressure drop increases from 19.587 to 24.296 Pa. Conversely, the surface heat transfer coefficient significantly decreases from 41.1214 to 30.8454 W m<sup>-2</sup> K<sup>-1</sup>. Heatsink structures with low tortuosity, exhibit more uniform distributions of temperature, velocity, and

turbulence kinetic energy (TKE), contributing to higher cooling efficiency. In contrast, heatsink structures with high tortuosity, have uneven distributions of temperature, velocity, and TKE, resulting in lower cooling efficiency. This research significantly contributes to the development of more efficient cooling technologies for electronic applications. The findings can serve as a foundation for designing more optimal heatsinks with appropriate tortuosity levels to counter excessive heat generation in electronic component.

Paper ID : 278

**EXERGY AND EXERGOCHEMICAL ANALYSIS OF  
BANJARSARI STEAM POWER CYCLE 135 MW LAHAT-  
SOUTH SUMATERA**

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**Abstract** - This paper presents a performance study of Unit 1 of the Banjarsari 135 MW steam power plant under real operating conditions, utilizing exergy and exergoeconomic analysis methods. The primary objective of this study is to determine exergy destruction and exergy efficiency, as well as exergy destruction costs and exergoeconomic factors for each plant component under operational circumstances. Additionally, the performance of the plant is evaluated across various ambient temperatures. The findings reveal that, at an ambient temperature of 30°C, the highest exergy destruction is observed in the boiler at 339.864 MW, followed by the intermediate pressure turbine at 9.192 MW. Conversely, the drain pump exhibits the lowest exergy destruction at 0.002 MW. The lowest exergy efficiency is registered in the boiler at 32.70%, succeeded by the low-pressure heater 7 at 40.98%, while the deaerator attains the highest efficiency at 97.48%. According to the exergoeconomic analysis, the greatest exergy destruction cost is recorded in the boiler at 5987.448 USD/h, trailed by the intermediate pressure turbine at 661.807 USD/h, with the condenser having the lowest cost. The lowest exergoeconomic factor is identified in the boiler at 7.77%, followed

by the low-pressure heater 5 at 9.62%. Ambient temperature significantly impacts plant performance, with lower ambient temperatures correlating with improved performance.



Paper ID : 281

**ENERGY AND EXERGY ANALYSIS IN THE  
PERFORMANCE EVALUATION OF LUMUT BALAI  
GEOTHERMAL POWER PLANT WITH THE ADDITION OF  
SECOND FLASH STEAM**

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**Abstract** - This paper presents an energy and exergy analysis aimed at exploring possibilities for enhancing the performance of the Lumut Balai Geothermal Power Plant in South Sumatra. Currently operating as a single flash system, the plant is examined after being modified into a double flash system. The primary objective of this study is to quantify the increase in output power and plant efficiency resulting from the introduction of the second flash steam. Another goal is to determine the exergy destruction magnitude for each plant component, both in its existing configuration and the modified setup. The investigation's findings reveal that the output power has surged from 55 MW to 65.667 MW, marking a notable increase of 10.667 MW or 18%. In the current configuration, energy efficiency stands at 13%, and exergy efficiency at 48%. In contrast, in the modified conditions, energy and exergy efficiency drop to 11% and 46%, respectively. In the present setup, the flash chamber experiences the highest exergy destruction at 50.57%, followed by the steam turbine at 26.96%, and the condenser at 24.11%. Similarly, in the modified conditions, the flash chamber exhibits the highest exergy destruction

at 47.60%, trailed by the steam turbine at 22.25%, and the condenser at 30.14%. It is advisable to undertake a comprehensive thermodynamic analysis, including exergoeconomic assessment, during the design phase of any geothermal power plant. This ensures that the desired output power is achieved with optimal efficiency.

Paper ID : 290

**FD ANALYSIS OF VORTEX GENERATOR VARIATIONS  
ON FIN AND TUBE HEAT EXCHANGER**

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**Abstract** - A fin and tube heat exchanger is a compact heat exchanger often used in refrigeration systems. The fluid stream flowing through the fins has a lower thermal conductivity than the fluid flowing through the tube. Low thermal conductivity results in high thermal resistance. Thus, to increase heat transfer in heat exchangers, an attempt was made to use a passive method by adding a vortex generator to the fin and tube heat exchanger design, producing a longitudinal vortex-his cause fluid mixing between hot and cold fluids, increasing the convection coefficient value. This research aims to analyze the effect of the longitudinal vortex on the increase in the value of the convection coefficient and the pressure drop that occurs. This research was conducted using a numerical simulation approach by varying the shape of the vortex generator in the form of rectangular winglet pairs (RWP), concave rectangular winglet pairs (CRWP) and convex rectangular winglet pairs (CRWP) and angles of attack of 5°,

10° and 15° on seven rows of tubes. The inlet fluid flow was varied at the Reynolds value of 284 to 662. The simulation results showed that the increase in the maximum convection coefficient occurred when using a vortex generator shape of Concave Rectangular Winglet Pairs (CRWP) at an angle of attack of 15°, and the Reynolds value of 662 was 154.13% of the baseline case. Meanwhile, the lowest pressure drop effect occurred in using a Rectangular Winglet Pairs (RWP) vortex generator at an angle of attack of 5° and a Reynolds value of 284 of 45.29% for the baseline case.

Paper ID : 301

## **DESIGN, ANALYSIS AND MANUFACTURING OF CUSTOMIZED BRACE FOR SCOLIOSIS THERAPY**

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**Abstract** - Scoliosis is a physical disorder of the spine with a curvature of the bones towards the back. Scoliosis is often treated by an orthotic device called brace. This research objective was to develop a new approach to identify the design of customized brace, based on reverse engineering, finite element analysis, and additive manufacturing. In this approach, torso geometry of the scoliosis patient was achieved using CT Scan. Data that generated a 3D torso surface model, which was modified using Computer Aided Design (CAD) software Fusion to design the 3D brace surface model. SolidWorks was used to establish finite element model of deformed spine and its biomechanical characteristics were analyzed. Manufacturing of the brace is conducted by additive manufacturing using PLA filament. Result show that the printing process using 3D Printing has the longest duration of the entire process. The length of the print time depends on the parameter setting. Finally, reverse engineering and rapid prototyping methods can be used for producing brace with complex shapes. This product has several advantages over conventional brace.

Paper ID : 308

**IMPLEMENTATION OF THE RELIABILITY CENTERED  
MAINTENANCE METHOD ON THE MINERAL WATER  
PRODUCTION MACHINE LINE AT PT. TIRTA SUKSES  
PERKASA BANJARMASIN**

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Abstract - One of the mandatory activities in the manufacturing industry is to perform maintenance. Maintenance is performed so that the machine can last a long time and production can continue. The purpose of this research is to identify critical engine components so that preventive maintenance can be carried out. The method used is reliability-centered maintenance, which includes FBD, FMEA, LTA, and selection tasks. The results obtained are the most critical machine component, namely the thermoforming servo motor, which has an RPN value of 256. The conclusion that can be drawn is that the most common failure of this component is an electrical trip, which can affect the entire production process because it causes the machine to stop and is quite dangerous for the operators. Therefore, the maintenance of these components will focus on regular component replacement and monitoring.

Paper ID : 309

**RISK ANALYSIS OF POTENTIAL HAZARDS ON THE  
PRODUCTION FLOOR USING THE HAZARD  
IDENTIFICATION RISK ASSESSMENT AND RISK  
CONTROL (HIRARC) METHOD (CASE STUDY: CV. SEKEN  
WORKSHOP)**

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Abstract - CV Seken Workshop is a company that strives to preserve the environment and is committed to using reclaimed teak wood as the main material in the furniture industry. Seken Workshop produces their products still using the manual labor of workers with the help of hand machines, the most work accidents are caused by the lack of workers' awareness of occupational health and safety, the use of PPE. There have been 53 cases of work accidents in the last 5 years. Most cases of work accidents occur due to worker negligence. The results of the study found that there was 1 potential hazard with a low risk category, 10 potential hazards with a medium risk category, 9 potential hazards with a high risk category, and 6 potential hazards with an extreme risk category. Risk control proposals for potential hazards are carried out on potential hazards with extreme categories in each area. The control recommendations given are using PPE such as safety gloves, ear plugs / ear muffs, safety glass, masks according to work standards (respirators), machine maintenance when not operating, supervision of the use of PPE, installation of signs, signs,

posters, hazard labels and replacing human labor when moving with forklifts.



Paper ID : 310

**IMPLEMENTATION OF PREVENTIVE MAINTENANCE ON  
PRODUCTION MACHINES TO INCREASE RELIABILITY  
VALUE USING RELIABILITY CENTERED MAINTENANCE  
(RCM) METHOD (CASE STUDY : CV. SEKEN LIVING)**

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**Abstract** - The production process of manufacturing companies is an important factor that must operate stably for optimal results. The continuity of the production process requires the support of the company's machines and production to maintain the consistency of machine performance. Maintenance plays an important role in the production activities of a company related to smooth or congested production and production volume. The method in this research is R.CM (Reliability Centered Maintenance), which analyzes using a qualitative approach so as to find the root cause of malfunction and provide the right solution. Based on the results of the RCM method analysis, it is determined that the selection of maintenance actions for critical components of the grinding machine, namely the Hydraulic Dresser component with TD (Time Directed) actions.

Paper ID : 312

## **EXPERIMENTAL STUDY OF CHAIN FLEXIBLE CLUTCH TRANSMISSION SYSTEM WITH STEEL AND BRASS AS MATERIAL**

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Abstract - A new shape coupling was tested to meet the needs of rotation and power transmits from a driving source to a propeller which functions to circulate water in fish ponds where one or two fractures along the shaft are required. Testing of this transmission system is still very early, where alignment and eccentricity are possible to exist on a small scale and still need further testing. The test was carried out with a variable fracture angle  $\phi$  from zero degrees (straight) until the transmission could not take place in this clutch. The shaft material is brass and polyethylene plastic. The main measurements were carried out on noise with the variable fracture angle  $\phi$  and RPM. Noise measurements were carried out in an open atmosphere with a rotation range of 600 – 2200 RPM and the shaft was held at 4 supports and 3 supports. The test results show that the chain clutch can transmit power and rotation with a maximum breaking angle  $\phi = 25$  degrees. Maximum noise in testing with brass material with four supports, 103 dB at 1700 RPM rotation, minimum noise is 96 dB at 800 RPM. The test results show that the noise tends to increase as the fracture angle  $\phi$  increases. Noise also tends to increase with increasing shaft rotation. In testing with steel of 6.8 mm diameter with three pins noise tends to reduce up to 7% and reduce up to 2% at 4 pins. Grease can reduce noise between 2% to 4%. Plastic

materials can reduce noise by up to 6%, but are not eligible for use as shafts due to their non-friction resistance, heat resistance and inadequate bending strength.

Paper ID : 318

**STUDY ANALYSIS OF THREE PHASE INDUCTION  
MOTOR STARTING USING ETAP AT PLN ULPL  
INDRALAYA, SOUTH SUMATERA**

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Abstract - Steam Generator of Electricity Power Plant at PT. PLN (Persero) UPDK Keramasan of ULPL Indralaya South Sumatra Area. This power plant has 3-phase induction motors, which are the most commonly used motors because of their reliability. The 3-phase motor is directly connected to the supply at a high starting current of around 5 to 7 times the motor rating current (nominal current). This large starting current can cause a considerable voltage drop on the supply line, thus affecting other loads connected to the supply line. Because the large current flows for a long time, it causes the motor to heat up, which will damage the insulation. Therefore, when starting the motor, the motor bus voltage must be kept at around 80% of the voltage rating. This study investigates whether the motor could start successfully under the operating conditions. We used ETAP software to simulate motor starting and also analyze these motors to obtain the values of starting current, starting torque, and voltage drop from the results of using VFD (variable frequency drive) on two motor units in LV Switchgear SUS-1 whose previous existing conditions were using DOL (Direct on Line). As a result of our studies, we obtained that the system can still maintain a bus voltage of 99.94%, a small starting current when starting the motor of 0% FLA (1 second) and reaches

99% FLA (4 seconds) with a starting torque of 54% and 57% of the load torque.

Paper ID : 319

**EXPERIMENTAL STUDY OF THE EFFECT OF ROLLER  
SHAPE VARIATIONS ON THE CVT SYSTEM USING  
PETROL-PYROLYTIC FUELS TOWARD THE POWER  
CHARACTERISTICS OF AUTOMATIC MOTORCYCLES**

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Abstract - There are two types of two-wheeled vehicles when viewed from the transmission system: manual and automatic. The automatic transmission circuit on the automatic motor, the roller (ballast), is on the primary pulley. In the market, various rollers (weights) are sold, starting from those that are standard and different from the standard with lighter or heavier weight variations. However, there are also aftermarket rollers produced in several automotive industries, one of which is UNIONMATERIAL. The difference lies in the shape and materials used. This study aims to analyze the effect of variations in the shape of the roller on the characteristics of power transmission on

automatic motorcycles. The type of vehicle used is a motorcycle produced in 2009 using a dyno test test with two test methods. The first test is from low engine speed  $\pm$  1400-1600 rpm to 9000 rpm, while the second test is from medium engine speed  $\pm$  4000 rpm to 9000 rpm. In addition, the fuel consumption test was also carried out. The variation used is a roller shape consisting of a round roller, a sliding roller, and a flying roller weighing 12 grams. The highest results obtained at a power of 0.7 HP occurred on the flying roller with 7.1 HP/ 3916 rpm, while the torque was 5.19 N.m on the flying roller (23.96 N.m/1250 rpm). There is an effect on fuel consumption, but not too significant. The biggest difference occurred in the engine parameter RPM 5000 of 0.1 between the flying roller (0.9 L/h) and sliding roller (0.9 L/h) with the round roller (1 L/h) - this happens because the shape of the flying roller is not cylindrical and more dynamic, which is adapted to the movable drive face. There is an additional wing on the roller weight. The data from the results of this study have implications for increasing vehicle performance without changing engine capacity, which requires large costs.

Paper ID : 321

### **3-PHASE INDUCTION ELECTRIC MOTOR AND VSD WITH TORQUE CONTROL FOR TIDAL TURBINE SIMULATOR: AN EXPERIMENTAL STUDY**

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Abstract - Tidal current energy sources have various advantages compared to other renewable energy sources, such as abundant potential, predictability, and high energy density. However, tidal current energy conversion systems face optimization challenges owing to the fluctuating innate nature of ocean energy. To support an optimization study, the existence of physical models is a plus, in addition to numerical studies. In this study, a tidal current turbine simulator based on a 3-phase induction electric motor and a variable speed drive was built to support torque regulation. The simulator is also equipped with a dynamic torque sensor to measure mechanical quantities, such as torque, mechanical power, and rotational speed. Its purpose is to investigate the use and performance of motors and drives in simulating changes in the mechanical torque. The results of the study revealed that the model can simulate changes in mechanical torque that produce changes in the electrical power in generators and generate technical considerations related to the development of control strategies for system optimization.



Paper ID : 366

**BLADE NUMBER INVESTIGATION OF PICO-SCALE  
CROSSFLOW TURBINE FOR LOW HEAD BY NUMERICAL  
METHOD**

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Abstract - Pico-scale crossflow turbines (CFT) can be an alternative solution to meet electrical energy needs, especially in remote rural areas. CFT is recommended because of its suitability in low head conditions and fluctuating discharge conditions. One of the parameters that influences the performance of a CFT is the number of blades of the runner. CFT was discovered in 1903 and is still developing; however, the study of the physical phenomena of flow due to the blade number on the energy conversion process has yet to be comprehensively depicted. Therefore, this study aims to analyze the effect of the blade's number of runners on CFT performance using the computational fluid dynamics (CFD) method. The CFD method can visualize the flow field more detail than analytical and experimental. The CFD method is run with a moving mesh feature (transient) and pressure-based solver with a head condition of 3 m. The blades number studied were 16, 18, 22, 24, 26, and 30. Based on

the results, the relationship of the CFT efficiency to blade number is described using a second-order multiple regression polynomial, and runner rotation is parabolic. Based on the performance curve, the CFT with 26 blades has the highest performance for low-head conditions.

Paper ID : 367

**MECHANICAL CHARACTERIZATION OF POROUS PLA  
SCAFFOLD WITH COMPLEX MICROARCHITECTURE  
FABRICATED BY ADDITIVE MANUFACTURING**

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Abstract - Bone transplantation remains the leading approach in addressing orthopedic trauma or disease. In cases where this option is not viable, bone tissue engineering offers an alternative through the use of scaffolding. This involves the removal of damaged bone tissue and its replacement with porous scaffold structures to support the regeneration process. Recently, additive manufacturing has emerged as a promising technology for producing scaffold structures that meet the necessary performance criteria. In this study, PLA scaffolds with

tortuous pore networks designs were fabricated using fused deposition modelling. Scaffolds were fabricated with four different porosity by changing the pore diameter in the range of 840 – 1732  $\mu\text{m}$ . A total of sixteen specimen were tested under monotonic compression testing. The result shows the elastic modulus each sample with 25, 45, 60, 75% porosity generate  $545.21 \pm 109.76$  MPa,  $446.82 \pm 57.12$  MPa,  $312.55 \pm 82.64$  MPa, and  $123.81 \pm 23.95$  MPa respectively. Finite element simulation showed good correlation with experimental results, allowing for a better assessment of scaffold mechanical behavior. Accordingly, the proposed finite element model is able to predict the mechanical behavior of fabricated bone scaffolds accurately. The results demonstrate that the numerically predicted elastic modulus of complex scaffold is not closer to experimental outcomes in comparison with as-built samples. Overall, attained results show that 3D printing with PLA can be applied in the manufacture of scaffolds for cancellous bone replacement.

Paper ID : 373

## **TEMPERATURE DISTRIBUTION OF RAKE ANGLE ON MILLING PROCESS**

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**Abstract** - In the lathe machining process, the thermal load significantly influences the tool's wear, which impacts the cost of the cutting process. Cutting speed and rake angle are included variables that influence the thermal load. This study aims to determine the optimum variable values for conduction heat transfer and cutting temperature and compare the two variables' influence. This study uses an experimental method using a K-type thermocouple where the wire is placed at the bottom of the insert from the carbide tool, close to the cutting interface. While the workpiece used was tested for chemical composition, the workpiece was AISI 1045, which is low carbon steel. After experimental testing and calculation of heat flux, it was found that the heat flux value is directly proportional to the cutting interface temperature value, so that the optimum value desired in this study is the minimum temperature value. It was found that the lowest heat flux value at every speed was at 5° rake angle and the highest heat flux value at -5° rake angle. After comparison, it was found that the cutting speed had a more significant effect than the rake angle on the interface temperature and heat flux. Although the experimental results are

entirely consistent with the theoretical basis, it is recommended to measure the distance between the thermocouple wire placement and the cutting interface of each test data set, and a flatter workpiece can also be used to obtain more precise temperature measurements.

Paper ID : 386

**PLASTIC-TYPE IDENTIFICATION BASED ON DIGITAL  
IMAGE USING MULTINOMIAL NAÏVE BAYES METHOD**

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**Abstract** - Recycling is a way to reduce plastic waste by reusing rather than throwing away. This way is also useful for reducing pollution due to greenhouse gas emissions generated in processing new plastic from raw materials. Nowadays plastic recycling activities continue to increase. The initial step in the plastic waste recycling process involves sorting plastic to distinguish different types of material. The success of accurately identification the plastic-type is very useful for sorting system building in recycling industry. The aim of this paper is to investigate the plastic-type identification performance using multinomial naive Bayes based on k-fold cross-validation method in the evaluation process. Multinomial naive Bayes is a statistical learning method that is often used because it often has adequate performance compared to other methods. The results showed that the multinomial naive Bayes method has a satisfactory performance on all performance measures in identification the plastic-type. The performance measures are 97.04% accuracy, 95.57% sensitivity, 97.78 % specificity, 95.57% F1 score, 95.57% precision, and 83.03% AUC.

Paper ID : 387

**ENHANCED TRAJECTORY TRACKING FOR  
DIFFERENTIAL MOBILE ROBOTS UTILIZING A FUZZY  
LOGIC CONTROLLER**

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Abstract - The application of non-analytical control systems, such as Fuzzy Logic, Evolutionary Computing, and Neural Networks, has gained acknowledgment for their demonstrated potential and inherent advantages in managing dynamic operational environments. The paper presents an adaptive and robust approach to control in situations characterized by fluctuating parameters and uncertainties. Within this context, the present study seeks to scrutinize diverse fuzzy control strategies utilized for the kinematic regulation of a mobile robot. Additionally, an extensive comparative analysis of the results will be carried out using the Simulink platform, a widely embraced tool in the field of control system design and analysis. This inquiry aims to provide valuable insights into the effectiveness and applicability of these control paradigms in the realm of mobile robotics, illuminating their performance merits under dynamic and variable conditions. The simulation results indicate that the fuzzy controller can yield proficient navigation performance, enabling the robot to reach its intended position and evade obstacles based on signals received from the infrared sensors and optical encoders.



Paper ID : 394

**SWARM OPTIMIZATION TO MODEL THE SURFACE  
ROUGHNESS OF AN AISI 4340 TURNING USING THE HOT  
MACHINING PROCESS**

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Abstract - Since the roughness of the surface is used to determine the quality of a product, it is a crucial consideration in turning machining. It significantly affects the cost of machining as well. This study forecasts surface roughness values for AISI 304 stainless steel hot lathe machining using the PSO methodology. The workpiece is heated to 100, 150, or 200 degrees Celsius before being turned. Afterwards, the depth, speed, and feeding rate of cutting are adjusted in order to determine the surface roughness of the workpiece. The feeding rate was determined to be the most significant influence in raising the surface roughness value, followed by cutting depth, cutting speed, and workpiece temperature. In terms of accuracy, the empirical modeling performs better. The PSO methodology illustrates an effective and straightforward method that might be applied to calibrate different empirical machining models.

Paper ID : 396

**COLD SINTERING PROCESS PARAMETER TAILORING  
FOR CUSTOMIZED HYDROXYAPATITE BASED  
COMPOSITE MATERIAL DEVELOPMENT**

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Abstract - COVID-19 has received considerable attention in this decade. In January 2020, this pandemic spread worldwide, resulting in a new rule concerning people's behavior termed the new normal era. Likewise, the changes in people's behavior compel changes in transportation behavior worldwide. The impact of COVID-19 is mostly felt in developing countries, which can't stand without economic resilience. As a developing country, Indonesia experienced a great impact immediately after the COVID-19 policy was announced as a new normal adaption era and after four months of being impacted by COVID-19. Thus, this study aims to investigate the impact of the new normal adaption of the COVID-19 pandemic on people's intention and decision to travel in Indonesia. The model of goal-behavior (MGB) was used as a base model to examine travel behavior decisions. The extension dimension about the perception of COVID-19 and perception of new normal behavior is used to complete the MGB for this study. The structural equation model was applied to observe the overall extension of the MGB. Practically, this study's finding and implications deal with the issue of COVID-19 that

has resulted in the alteration of people's travel behavior; this finding and implication would be valuable for government agencies, transportation policy makers, transport systems providers, and, indirectly, tourist travel behavior during pandemics in next future.

Paper ID : 397

## **DIMENSIONAL ERRORS ANALYSIS OF CORTICAL SCREW DURING THREADING OF MAGNESIUM AZ31**

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Abstract - The development of manufacturing for large productivity and good quality in the modern era has emerged the need of using suitable methods. Taguchi Method or robust design method is one of them which has been implemented for optimizing a process in a single response. This experiment aims to analyse the cutting parameters of geometrical errors of the threads. The machining trials were done concerning the diameter of the workpiece, depth of cut, and spindle speed. Three responses were investigated in this experiment pitch, height threads, and angle threads error. Meanwhile, the external thread selected is metric M1,5 with 3 levels of 3 factors. This research used variations of workpiece diameter of 10, 14, and 18 mm, depth of cut of 0.23, 0.3067, and 0.46 mm, and spindle speed of 212, 318, and 424 rpm. The result shows that the most significant factor that affected pitch error and height thread error is spindle speed. Otherwise, the factor that significantly affected thread angle error is the depth of cut and diameter workpiece, respectively. The optimal condition to produce low thread angle error is machining at a diameter of the tool of level 1, depth of cut of level 3, and spindle speed of level 3.

Paper ID : 399

**PREPARATION AND FABRICATION OF POROUS COPPER  
USING EGG YOLK AS THE FOAMING AGENT**

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Abstract - Copper, renowned for its exceptional thermal conductivity and properties, finds widespread application in various fields. Nevertheless, the creation of porous metals remains a formidable challenge in materials research. This study aimed to explore the impact of sintering temperature and the ratio of copper powder to egg yolk on the production of porous copper. The methodology employed here followed a powder metallurgy approach, utilizing egg yolk as the foaming agent. The initial green mixture was subjected to drying at 160 °C, with subsequent sintering at temperatures of 750 °C, 800 °C, and 850 °C. The outcomes of our investigations revealed that the highest achieved porosity, reaching 85.62%, was attained when employing a copper powder to egg ratio of 1:1.25 during sintering at 800 °C with a heating rate of 10 °C/min. Additionally, the porous metal exhibited a maximum compressive strength of 0.03 MPa. The pore sizes within the sintered material ranged from 12.55 µm to 288.3 µm. Characterization of the resultant metal foam disclosed a composition of 99.95% copper (Cu) and 0.033% lead (Pb). Furthermore, the porous

copper displayed a minimum density of  $1.21 \text{ g/cm}^3$  and experienced shrinkage levels spanning from 16.51% to 39.26%.

Paper ID : 400

**AIRFOIL DESIGN AND AERODYNAMICS  
CHARACTERISTICS OF FUEL EFFICIENCY CAR: CFD  
ANALYSIS**

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Abstract - The use of land transportation, primarily cars, is increasing every year. The energy required will increase along with the number of vehicles. To date, car manufacturers are required to improve the design a car that will save fuel and be environmentally friendly. The energy-efficient car competition, namely KMHE Indonesia is organised for students of mechanical engineering to contribute directly to research related to energy-efficient cars in Indonesia. One of the ways to save fuel is to reduce the aerodynamic force drag on the vehicle. This study aims to optimize the prototype vehicle airfoil design in producing the smallest possible coefficient of drag ( $C_d$ ) and lift ( $C_l$ ). A Taguchi design of experimental (DoE) is applied to set the 9 designs for this study, with three different values considered for each design parameters: Defiant Canard BL110, Clark YM15, Gottingen 256 for side airfoil shapes and Gottingen 410, Gottingen 460, and Boeing 737 Root for top airfoil shapes. This aerodynamic analysis uses the ANSYS 2020 R1 software, which is carried out at a speed of 30 km/h. Then the  $C_d$  and  $C_l$  values obtained will be analyzed. The results obtained for the optimal design of the  $C_d$  with variations in the side airfoil design Defiant Canard BL110 and top airfoil is Goettingen

410 with a Cd value of 0,1119. As for the optimal design of the Cl with variations in the side airfoil design Goettingen 256 and top airfoil is Goettingen 460 with a Cl value of 0,0250.



Paper ID : 403

## **POLYMER BASED MEMBRANE FOR WATER FILTRATION SYSTEM**

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Abstract - Membrane technology is crucial in several stages of downstream bioprocessing for bioproducts. These stages include sterile filtration, clarification, initial harvest, and product purification. In each of these steps, membranes are utilized to achieve specific goals, such as removing impurities, separating different components, or ensuring sterility. Membrane has found applications across various domains within downstream bioprocessing. Membrane fabrication has grown rapidly both in terms of methods and materials used. Some important issues in membrane research such as fouling and mechanical properties of membranes. This paper reviews the material, fabrication and characteristics of polymer-based membranes such as membrane morphology and clean water permeability on membranes.

Paper ID : 405

## **USING A YOLOV8-BASED OBJECT DETECTION MODEL FOR AN AUTOMATIC GARBAGE SORTING SYSTEM**

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**Abstract** - This study presents the development of an automatic garbage sorting system based on computer vision techniques and the You Only Look Once version 8 (YOLOv8) algorithm. RGB images of garbage, including cans and plastic bottles, were collected by a camera. The YOLOv8 model, trained on a dataset of both RGB images of cans and plastic bottles, acts as the core for detection and classification. During real-time sorting, the classification results and picking points from the YOLOv8 model are used by a gantry robot. The gantry robot is developed and controlled by a Programmable Logic Controller (PLC) for placing each type of garbage into its respective categories. In order to pick up garbage moving on the conveyor, a conveyor tracking algorithm was implemented. The system's performance is evaluated using 20 garbage samples for the can and the plastic bottle category. The accuracy, precision, recall, and F1 score were 92.5%, 90.5%, 95%, and 92.7%, respectively. The system proposed in this study can be modified to sort other garbage types.

Paper ID : 412

**INVESTIGATING DISSIMILAR WELDING QUALITY OF  
AISI 4340 AND ST 36 CARBON STEELS VIA SHIELDED  
METAL ARC WELDING FOR STRUCTURAL  
APPLICATIONS**

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Abstract - This research delves into the optimization of welding processes for dissimilar materials AISI 4340 and ST 36, addressing the complexities and challenges associated with such joints. The study employs the Taguchi Method to investigate key welding parameters, including electrode type, welding current, joint type, and welding speed. Orthogonal arrays are utilized to efficiently manage the experimental data, facilitating clear conclusions. Sample plates are machined to specific dimensions, and welding is carried out using the Shielded Metal Arc Welding (SMAW) method with various electrode types. Tensile strength is employed as a critical metric for evaluating weld joint performance. The study employs the "larger is better" criterion to optimize welding conditions, with a focus on achieving higher tensile strength. The results reveal that the choice of electrode type significantly impacts joint strength. Moreover, the heat input, influenced by parameters like welding speed, plays a vital role in determining the mechanical properties of the weld. Microstructural analysis sheds light on the intricate changes that occur during welding.

The fusion zone exhibits finer grain structures compared to the base metals, owing to the rapid thermal cycle induced by welding. The welding electrode also influences the microstructure by introducing alloying elements and filler material. Additionally, the research addresses angular distortion, a common issue resulting from welding-induced residual stresses. Excessive welding currents are found to contribute to higher angular distortion. These findings provide valuable insights for engineers and welders seeking to optimize welding processes and ensure the reliability and performance of dissimilar material joints.

Paper ID : 413

**DEVELOPMENT OF POROUS CERAMIC FILTERS FOR  
CARBON DIOXIDE CAPTURE USING  
HYDROXYAPATITE/SiO<sub>2</sub> COMPOSITE**

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**Abstract** - The development of industries in Indonesia has driven an increased use of ceramic filters for carbon dioxide (CO<sub>2</sub>) capture. However, the availability of high-quality filters remains a challenge. This research aims to develop porous filters from a composite of hydroxyapatite/SiO<sub>2</sub>. The composite is reinforced with SiO<sub>2</sub> at a concentration of 20-30% and utilizes processed purple sweet potato powder as a space holder. The manufacturing process begins by mixing hydroxyapatite powder, SiO<sub>2</sub> powder, and purple sweet potato powder using a ball mill at a rotation speed of 225 rpm for 3 hours. Subsequently, the mixture is moulded using a uniaxial pressure compacting machine. Green specimens are then sintered at a temperature of 900°C with a holding time of 3 hours. Apparent density testing is conducted using the Archimedes method, resulting in the highest apparent density of 1.520 g/cm<sup>3</sup> with a porosity of 49.62% in the HA/SiO<sub>2</sub> specimen with a 20% space holder. X-Ray Diffraction (XRD) analysis indicates that the dominant phases are hydroxyapatite (HA) and SiO<sub>2</sub>. Microstructure observation using Scanning Electron Microscopy (SEM) suggests the presence of pores ranging in size from 4.510 μm to 67.32 μm, with interconnected pores formed.

Carbon capture testing shows a reduction in CO<sub>2</sub> concentration of 50% after passing through the filter from the initial concentration. This research contributes to the development of porous solid filters with potential industrial applications, utilizing sustainable materials.

Paper ID : 414

**LEVERAGING MACHINE LEARNING TO MODELLING  
SURFACE ROUGHNESS OF AISI 4340 TURNING  
OPERATIONS**

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**Abstract** - This study investigates the application of machine learning techniques for modeling surface roughness in AISI 4340 turning operations. The research focuses on key parameters including feed rate, machining velocity, depth of cut and temperature, which significantly influence the surface roughness quality of machined components. A dataset comprising varying combinations of these parameters was collected through controlled experimental trials. Employing advanced machine learning algorithms, including regression and neural networks, we establish predictive models to accurately estimate surface roughness based on the specified inputs. The proposed models demonstrate notable efficacy in capturing the intricate relationships between process parameters and surface quality. The findings offer valuable insights for optimizing turning operations in AISI 4340 machining processes, ultimately enhancing product quality and process efficiency.

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Paper ID : 296

**NEIGHBOURHOOD BUILDING TYPOLOGIES TO SUSTAIN  
FLOOD MITIGATION STRATEGIES TOWARD URBAN  
SUSTAINABILITY. CASE STUDY: BENDUNG RIVER,  
PALEMBANG, INDONESIA**

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Abstract - Palembang is one of the municipalities in Indonesia that is affected by the annual flood. Flooding is one of the major threats to accomplishing sustainable development of an urban area. The study area of this research is in a watershed of Palembang with the highest rate of flooding, with several flood mitigation systems implemented there, which is along the riparian of Bendung River. This paper purposes to elaborate on the typology of buildings in neighbourhoods scale in the study area especially residential buildings along the riparian. The research methodology uses spatial analysis with ArcGIS to determine the building typology of neighbourhood scale in the study area divided into 11 segments based on the intersection of roads and river tributaries. A spatial typology and patterns of an area is crucial and should be considered for flood preventive measures and protection system based on the existing characteristics of the affected area. The research outcome is projected to assist future urban planning for flood mitigation strategies in Palembang City that refer to urban sustainable development.

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Paper ID : 298

**COLONIAL ARCHITECTURE'S RESPONSE TO THE  
TROPICAL ENVIRONMENT: EXPLORING THE CONCEPT  
OF KARSTEN'S GARDEN CITY IN TALANG SEMUT,  
PALEMBANG**

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Abstract - Throughout the architectural history of Indonesia, particularly in Palembang, Dutch influence has left a notable mark on several buildings in specific regions. The adaptation of Dutch Colonial Architecture to the local climatic conditions in the Talang Semut area of Palembang has revealed a rich diversity in architectural styles and functions. This adaptation process bears relevance not only in historical contexts but also in contemporary and future design practices. This research employs a descriptive analysis methodology to investigate the process of adapting Dutch Colonial architecture to the tropical climate of Palembang. The findings underscore the significant impact of this adaptation, resulting in buildings that harmoniously integrate with their local environment, reducing reliance on artificial air conditioning systems. Dutch colonial architecture's climatological solutions have stood the test of time, offering a sustainable approach to architectural design that remains relevant today and holds promise for the future.

Paper ID : 299

**SUSTAINABLE URBAN DEVELOPMENT ALONG  
RIVERFRONT SETTLEMENTS: EXPLORING HOUSING  
FOUNDATION AND BOUNDARY STRATEGIES**

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Abstract - Settlements with inadequate living conditions along riverbanks contribute to the degradation of riparian ecosystem services and a diminished quality of life for their inhabitants. Balancing the urban housing needs with the imperative of conserving the ecosystem's health relies on a revitalization approach to development in these areas. This research explores the usage of stilt foundations and development boundaries as strategies to curtail environmentally detrimental construction along riverbanks. The study examines the riverfront development over period and its impact on building growth. Additionally, we investigate the current utilization of stilt foundations, which present a practical solution for construction in areas subject to tidal fluctuations. Research data encompasses historical settlement development maps from various time periods. Field data collection also centers on building foundations and their modifications. The results indicate a continuous densification of the area over the years. A noticeable shift in foundation usage from stilt to ground foundations reflects a departure from building techniques for tidal wetland.

Paper ID : 303

**STUDY ON URBAN PUBLIC SPACES OF RIVERSIDE  
TRADITIONAL SETTLEMENT TO SUPPORT  
COMMUNITY BASED TOURISM: CASE STUDY 3-4 ULU  
PALEMBANG**

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Abstract - Community-based tourism is a form of tourism in which local residents invite tourists to visit their communities. It allows tourists to explore local habitats, celebrate and respect traditional cultures, rituals, and wisdom. This form of tourism raises awareness within the community about the commercial and social value of their natural and cultural heritage, fostering community-based conservation of these resources. Urban public spaces are areas accessible to both tourists and local residents for various activities. These spaces offer tourists the opportunity to enjoy the surrounding environment. Public open spaces play a crucial role in community-based tourism. Kampong 3-4 Ulu Palembang, a traditional settlement in Palembang, is an attractive destination for tourism due to its many traditional houses, unique neighborhood patterns, and traditional activities such as making traditional food, river transportation, and crafting. The community living in 3-4 Ulu has been there for generations, inheriting their houses from their parents. To support both the community and tourism activities, it is essential to facilitate tourism activities and provide urban public spaces for both the community and tourists. The research employs a mixed-method approach, combining qualitative and quantitative methods. It utilizes a concurrent mixed research strategy, incorporating case study research and survey research methods. The analysis focuses on circulation paths and open spaces.

The research findings, based on local preferences, prioritize connectivity between the land and river for circulation paths and emphasize the availability of public open spaces. Well-designed paths or roads facilitate visitors in navigating the community effectively to enjoy every aspect of the area. Urban public spaces are essential in urban spatial planning as they serve as communal hubs for community social life.

Paper ID : 368

**ANALYSIS OF FIRE DISASTER RESILIENCE IN MUSI  
RIVERSIDE SETTLEMENTS. CASE STUDY: KELURAHAN  
5 ULU, PALEMBANG**

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Abstract - Palembang with the vast Musi River flows across the developing urban area, has dense settlements with mainly the residents' houses made of wood. Such residential areas with high density are prone to fire hazard. Several settlements were built without regard for safety, health, and well-being of its residents, such as narrow roads, limited access, and a lack of green open space. This study aims to frame strategies from existing spatial characteristics to draw conclusions for fire resistance and resilience improvement of settlements in Kelurahan 5 Ulu. The focus of the research is analyzing the influence of the relationship between land use, building density, road patterns and road dimensions, space between houses, distance to water sources, and building quality types with respect to fire hazard management. The research uses a descriptive survey and spatial analysis data processes. The output of this study is expected to give significant input to the improvement of future urban planning. In conclusion, eventually, the government and residents' awareness of the areas and buildings that are responsive to fire disasters, especially in their neighbourhood will be enhanced.







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**MINING AND GEOLOGICAL ENGINEERING**

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Paper ID : 289

**DETERMINATION OF GROUNDWATER POSITION BY  
USING GEOELECTRIC 1D AT TANJUNG LUBUK  
DISTRICT, OGAN KOMERING ILIR REGENCY, SOUTH  
SUMATERA**

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Abstract - Geoelectric measurement of one-dimensional resistivity (1 D) at location for knowing groundwater basin geometry and aquifer system configuration as well as aquifer and non-aquifer system parameters irrigation by using the Wenner configuration. The position of the measurement sounding point used differs according to the  $t_{\text{traverse}}$  line (subsurface) being studied. As for the results of processing with IP2Win software. The groundwater position is obtained below the surface, which is at traverse line 1. Based on the analysis, it is found that in this Swamp Sediment formation it is possible to have the absence of a water-carrying layer. In traverse line 2, based on the analysis, it is found that in this Swamp Sediment formation it is possible to have a water-carrying layer at a depth of 23.5 to 97 m because of the formation component in the form of sand. In traverse line 3, it is found that in this Swamp Sediment formation it is possible to have the absence of a water-carrying layer. In traverse line 4, it is found that in this Kasai formation it is possible to have the absence of a water-carrying layer. In traverse line 5, it is found that in this Kasai formation it is not impossible to have the presence of a water-carrying layer.

Paper ID : 311

**GEOMECHANICAL MODEL USING GEOLOGICAL  
STRENGTH INDEX AND UNIFIED COMPRESSION  
STRENGTH IN SLOPE STABILITY ANALYSIS AT BANKO  
TENGAH, PT. BUKIT ASAM TBK .**

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**Abstract** - All levels of a mining organisation need a solid understanding of the geomechanical mining risk and an effective risk management and communication strategy. The mining production phase in Banko Tengah has begun, but there has been no coal production on the low wall due to the unstable slope, which can cause landslides and limit the amount of land available for excavation. Here, we propose a change to an existing method that makes it possible to build a simple geomechanical model that can be changed based on mining developments and used to make suggestions for the design parameters of mining production slopes in open-pit operations. The modified model considers rock mechanics experiments on rocks gathered at the district scale, UCS estimate, GSI characterisation, and FEM modelling with simplified Bishop and probability Monte Carlo simulation. Based on the slope stability analysis, the optimal values for slope geometry depend on forming benches, berm width and slope ratios. The design shows variation in safety factors in a stable slope with a probability of failure between 9.6% and 16.3%.

Paper ID : 315

**APPLICATION GEOLOGICAL ATTRIBUTES IN  
LANDSLIDE HAZARD ZONATION, CASE STUDY CILELES  
AREA, LEBAK REGENCY, PROVINCE OF BANTEN**

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Abstract - Landslides are affected by their environmental elements, neighbouring environmental factors, and the clustering effect, represented as neighbourhood characteristics of modelling spatial datasets in landslide hazard zonation (LHZ). This study inventively examines landslide spatial dataset neighbourhood characteristics to reduce LHZ uncertainty. Utilizing remote sensing and geographic information systems (GIS), neighbourhood environmental elements reflecting landslide environmental variables were collected and managed. In Cileles Area, Banten, the hydrological slope unit was used to map six environmental parameters: elevation, slope, relative relief, lithology, NDVI and NDWI. Finally, the LHZ uncertainties were derived using prediction accuracy and landslide-susceptibility index distribution patterns (LSIs). The results demonstrated that the enhanced weighted average and neighbourhood environmental elements could ensure LHZ accuracy. It was much higher than the LHZ results without considering the neighbourhood conditions.

Paper ID : 316

**OCEAN PLATE STRATIGRAPHY OF THE MEETING OF  
THE WOYLA AND WEST SUMATRA BLOCKS IN BUKIT  
GARBA, SOUTH SUMATRA**

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**Abstract** - The island of Sumatra has a unique tectonic setting consisting of several blocks, such as the Sibumasu block, the Medial Sumatra tectonic zone, the West Sumatra block, and the Woyla block. Research on Garba Hill is interesting because, in this area, the bedrock is visible due to the meeting of two blocks, namely the West Sumatra block and the Woyla block, which displays diverse lithology with a complex geological structure. This research aims to determine the stratigraphy that makes up Ocean Plate Stratigraphy (OPS) in the research area. The research method used to complete this research was field data collection, laboratory analysis, and studio work. The OPS sequence in the Woyla block in the research area is interpreted to originate from the midge oceanic ridge to the mélangé area, composed of igneous, metamorphic, and sedimentary rock units.

Paper ID : 323

**TURBIDITE LITHOFACIES DETERMINATION AND  
DEPOSITIONAL ENVIRONMENT OF NEOGENE  
SEDIMENTARY IN KALIKAYEN RIVER, METESEH  
SECTION, SEMARANG, CENTRAL JAVA**

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Abstract - The research was conducted in Kalikayen River, Meteseh section, Semarang, Central Java. Kalikayen river flow from Ungaran in the southern part to Eastern Semarang in the northern part, flowing through various formations namely Kerek and Kalibeng Formation. The research aims to determine the sedimentary processes and give a glimpse of the paleoenvironment based on detailed measuring stratigraphy. The measurements conducted at 15 meters outcrop at the side of the river. Comprehensive documentations using drone camera and thin section analysis help to understand more of the lithological characteristics. The stratigraphical measurements showed conglomerate, normal graded very coarse to medium sandstone, parallel lamination of fine-medium sandstone, ripple-bioturbated interbedded fine-medium sandstone, and interbedded claystone and sandstone. Based on the stratigraphical column, it can be divided into three facies associations, which tell the three different sediment processes: debris flow, channel fill deposit caused by turbidity currents, and a high concentration of turbidity current. The paleoenvironment of this section located in Upper-fan to Upper Mid-fan part of deep sea-fan.



Paper ID : 324

**SLOPE STABILITY ANALYSIS USING BISHOP METHOD,  
CASE STUDY CIPANAS DISTRICT, LEBAK REGENCY,  
BANTEN PROVINCE**

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Abstract - Natural disasters such as landslides are a series of events that have a direct impact in the form of threats to people's lives caused, either by natural or non-natural factors. The direct impacts caused are environmental damage, property losses, psychological consequences, and casualties. Landslides are common in the area due to the area's high slope, especially when the rainy season arrives. Almost all incidences of steeply rising slopes, with or without warning signs, can result in landslides. Due to frequent landslides, it is necessary to analyze slope stability using the Bishop's method and GeoStudio Slope/W 2012 application model. In conducting the analysis, data on physical properties test results in the form of cohesion ( $c$ ), inner shear angle ( $\Phi$ ), and unit weight ( $\gamma$ ) are needed. In addition, slope geometry data is also used. The study area is 9 x 9 km, observed in five landslide locations, i.e. Mekarwangi, Sukasari, Ciminyak, Cikarang and Pasirhaur Village. It aimed to determine the degree to which landslide vulnerability existed. The study's risk factor results generated safety factor values ranging from 0.63-0.19, indicating that the slope is critical and unstable.

Paper ID : 327

**LINEAMENT ANALYSIS FOR EVALUATION OF  
LANDSLIDE POTENTIAL USING THE WEIGHTED  
OVERLAY MODEL, STUDY CASE KEMANG AND  
SURROUNDING AREAS, CIANJUR REGENCY, WEST JAVA**

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Abstract - A landslide is a natural disaster involving the sudden movement of rock or soil mass. A natural disaster can influence geological, atmospheric, and anthropogenic factors. This research was conducted to reveal lineament in controlling landslides that have the potential to occur in Kemang and surrounding areas. Lineament is considered an essential geological structure indicator for determining general and local tectonic trends and fault zones in rocks. Lineament can also help analyze the potential for a landslide. The method uses spatial analysis to examine the study area's lineament and slope data. Overlaying lineament, lineament density and slope maps resulting from the research provide visualization and interpretation of potential landslides in the study area. The analysis results indicated that the study area had a high lineament density with the dominant direction of NW-SE. Landslides tend to occur in areas with high lineament density and low-resistance volcanic and sedimentary rocks.

Paper ID : 328

## **IDENTIFICATION OF THE MORPHOLOGY OF THE OLD CITY CENTER OF JAMBI AS A RIVERFRONT CITY**

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**Abstract** - Waterfronts play a vital part in the development of many cities. Several great cities start on the brink of water, whether it's the sea or a river. Jambi originated on the banks of a river, which later evolved into the city centre. The research presented in this article is a preliminary examination of the physical elements of morphology in the historic city centre, which is crossed by a big river. The study's subject of inquiry is: What is the morphology of Jambi's historic city centre as a riverfront city? The purpose of this study is to determine the physical features of the morphology of Jambi's historic city centre. The research goal is to identify the morphology of Jambi's historic city centre as a riverfront city. The qualitative description approach was applied in this study. The approach employed is content analysis on several old and new maps. According to the findings, the historic city centre of Jambi has a checkerboard structure with the building oriented towards the river. Approximately 100% of the land is utilised. The port and ferry piers dominate the old city centre. The ferry piers also known as *pelayangan* in local language.

Paper ID : 332

**MORPHOLOGICAL PARAMETERS OF MOUNT  
GAMALAMA, NORTH MALUKU, BASED ON DEM  
SPATIAL ANALYSIS**

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Abstract - This paper aims to apply the GIS-method through DEM to generate the morphological information to support the disaster risk assessment in Ternate Island and make a comparison of two data input for geomorphological analysis through GIS-based method. The two data input are topographic map of Indonesia (RBI) and DEMNAS. Eight maps with four parameters were analyze here, consist of a height information data map, slope data map, aspect data map, and curvature data map. Both the digital elevation models (DEMs) obtained from RBI and DEMNAS can be utilized for assessing morphological characteristics in volcanic islands, although DEMNAS provides more detailed results. Based on the results, Ternate Island defined as a small volcanic island with relatively stable gravitational conditions, primarily due to its elevation being below 2500 meters above sea level (asl). However, the island remains vulnerable to potential flank collapse or mass flow events due to its steep slopes, slope direction, and curvature characteristics.

Paper ID : 341

**APPLICATION OF ALL WEATHER ROAD (AWR) METHOD  
ON OVERBURDEN HAULING ROADS AT COAL MINING**

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Abstract - PT. Bina Sarana Sukses is a mining company in Indonesia, which operates in the mining and sales of coal commodities. This research was carried out on the Alam 1-3 pit overburden hauling shaft road at PT site. Muara Alam Sejahtera, the current condition of the haul road on the overburden hauling axis road is undulating. The condition of the transport road reduces the speed of the CMT106 transport equipment, resulting in the productivity of the CMT106 unit not being achieved. Efforts made to improve the condition of the haul road are by applying the All Weather Road method as a method of strengthening the haul road. This research was carried out by analyzing and processing data from in-situ test results and actual data collection in the field. In situ testing carried out in the field is dynamic cone penetrometer (DCP) testing to determine the value of soil density and soil bearing capacity in initial conditions and in conditions after applying the All Weather Road method. Actual data collection in the field is in the form of CMT 106 cycle time and CMT 106 speed data which is used to evaluate CMT 106 productivity before and after the All Weather Road method is applied. The soil density value on the haul road is calculated using the California Bearing Ratio (CBR) method. From the test results it was found that the initial conditions on all haul road Segments on average did not meet the haul road subbase standard, namely  $\geq 50\%$ . After applying the AWR method to

the haul road, the soil density value on all road Segments increased. In layer 1 all road Segments have a CBR value of  $\geq 30\%$  on both the empty and loaded side, in layer 2 all road Segments have a CBR value of  $\geq 50\%$  on the empty and loaded side, this shows that the soil resistance value on both layers meets road standards transport. Apart from increasing the CBR value and soil bearing capacity, the application of AWR is also able to increase the speed of the CMT 106. Based on the results of direct data collection in the field, it was found that the speed of the CMT 106 increased by 3km/hour both during load travel and when empty travel. The increase in CMT 106 speed had a direct impact on the increase in CMT 106 productivity from initially 22,676.8 bcm/month, increasing by 5.5% to 28,345.9 bcm/month.

Paper ID : 349

**THE EFFECT OF GROUND VIBRATION OF BLASTING  
ACTIVITIES ON THE STABILITY OF MINE SLOPES**

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Abstract - Mining activities at PT Bukit Asam Tbk. have one of the methods, namely drilling and blasting methods. However, this drilling and blasting activity can cause adverse effects on the stability of the mine slope due to ground vibration if it exceeds the predetermined safety limit. To find out the safe limit, the author conducted research with seismic wave data in order to obtain PPV, Amax and Safety Factor data. Based on the results of observation data shows a graph of the relationship between distance and PPV where the smaller the PPV value, the greater the distance obtained, this is evidenced by the smallest distance of 102 m getting a PPV value of 5.97 mm / s and the largest distance of 130 m getting a PPV value of 3.76 mm / s. For data on the maximum Amax value obtained, the PPV value is the lowest. For the maximum Amax value data obtained from the Amax equation results to the largest field blasting vibration measurement data of 0.029 g, the slope safety factor value in a water-saturated state is 3.199. For data on the test results of the slope safety factor in a water-saturated state influenced by the Amax value, the value of the slope safety factor in water-saturated conditions with an Amax value of 0.010 g - 0.029 g is obtained as a safety factor of 3.106 - 3.166. Based on the above data from the trial and error test results, we recommend the provision of blasting vibration standards that are safe for slopes in

water-saturated conditions, namely with an  $A_{max}$  value of 0,0356 g and a safety factor of 3.085 and a distance of 8 meters.



Paper ID : 350

**ANALYSIS OF THE EFFECT OF SOIL PERMIT BEARING  
CAPACITY ON GROUND PRESSURE OF TERZAGHI  
METHOD MECHANICAL EQUIPMENT IN THE AIR LAYA  
MINE PT BUKIT ASAM TANJUNG ENIM SOUTH  
SUMATRA**

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Abstract - Bukit Asam Tbk is one of the world-class mining companies that has a recorded power of resources and large coal reserves. Mining activities are carried out with an open mining system that is not exempt from the use of mechanical equipment to support production operations. Inappropriate selection of tools is specifically needed in the mining area so as not to cause the tool's failure and work accidents that can reduce the productivity of work. The productivity of the work is compared directly with the material strength value because the greater the value of the ground support power then the movement of the tool over the surface will be better. The mechanical tool used has a large and load so will give ground pressure on the ground material of the mine area passed, then analyze the impact of the land support power permission on the tool to reduce the risk of accident due to blast and determine whether the tool used has a ground pressure value that corresponds to the ground strength value obtained. The power support values of land permits are calculated based on the physical and mechanical properties test variables. The first location was 4,30 kg/ cm<sup>2</sup> and the second location was 30,61 kg/ cm<sup>2</sup>. With a

ground pressure value of  $1,94 \text{ kg/ cm}^2$ , the mechanical excavator bulldozer was  $1,18 \text{ kg/cm}^2$ , the dump truck was  $7,46 \text{ kg/ cm}^2$ , for the first and second locations only excavators and bulldozers could pass, whereas for the dump trucks it could not, but at the second location all such mechanical tools could pass.

Paper ID : 351

**DETERMINATION OF GROUNDWATER POSITION BY  
USING GEOELECTRIC 1D AT TANJUNG LUBUK  
DISTRICT, OGAN KOMERING ILIR REGENCY, SOUTH  
SUMATERA**

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Abstract - In Indonesia there are many coal deposits, one of which is in South Sumatra Province, precisely in the Tanjung Enim area. The coal is managed by PT Bukit Asam Tbk. which is one of the state-owned companies with a focus on coal mining. PT Bukit Asam. Tbk has a Mining Business License (IUP) area of 90,702 hectares. Of this area, the operating pits include Air Laya Mine (TAL), Muara Tiga Besar (MTB), Townsite (TSBC), and West Banko. The results of the analysis for a single slope using Bishop Method obtained results for slopes with claystone material with a slope height of 15 meters and a berm width of 5 meters obtained an FK value of 1.608. For siltstone material with a slope height of 10 meters and a width of 5 meters, the FK value is 1.694, and for sandstone material with a slope height of 15 meters and a width of 5 meters, the FK value is 2.11.

Paper ID : 352

**COMPARISON OF BISHOP AND JANBU METHODS IN  
SLOPE ANALYSIS AIR LAYA MINE PT. BUKIT ASAM,  
TBK, TANJUNG ENIM, SOUTH SUMATERA BY USING  
ROCKSCIENCE SLIDE V6.0 SOFTWARE**

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Abstract - This study was conducted to analyze the slope through the safety factor figure in the slopes of the Water Slope Mine. The slope stability analysis was done by comparing the simplified Bishop Method with the simplifying Janbu Method using the Rocscience Slide V.6.0 application. The data analyzed in this study are geometry of slope, cohesion, and weight of soil type. The analysis is based on three types of material: Claystone, Siltstone and Sandstone. Based on the analysis of the three materials, it can be seen that the single slope and the entire slope are in a stable condition of the FK values obtained  $\geq 1.25$ . The result of the individual slope using the Rocscience Slide V.6.0 application with the Bishop material method Claystone, Siltstone and Sandstone in succession is 2.96; 4.22; and 3.48. Whereas with the Janbu method in sequence is 4.12; 6.07; and 4.6. The differences between the two methods are quite significant but still relatively stable for saturation conditions.

Paper ID : 361

**RESOURCE ESTIMATION AND ENVIRONMENTAL  
ANALYSIS OF COAL DEPOSITION BASED ON SULPHUR  
AND ASH CONTENT OF COAL IN DESA SUNGAI  
LINGKAR, BATANG HARI, JAMBI**

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Abstract - The study of geological and chemical components is necessary in coal mining. This research aims to calculate resource estimation and analyse the coal deposition environment. This study was carried out by field mapping using the stratigraphic measurement method, the polygon method to determine resource estimation on coal, and the proximate analysis method with sulfur and ash content parameters to interpret the depositional environment. Additionally, this research used the petrographic analysis method to identify rock lithology. The lithologies identified at the research site are sandstone, claystone, and coal obtained from stratigraphic measurements and open-hole drilling results carried out in petrographic analysis. The estimated coal resources at the study site were 62,371.99 tonnes. The low sulphur composition (0.36-0.43 per cent) and low ash content (1.74-2.10 per cent) of Seam 1 and Seam 2 coals that have been mined indicate that the environment in which the coal was deposited was not influenced by seawater. Instead, the coal was deposited on land in an upper delta-plain fluvial environment with channel deposition as a sub-environment.

Paper ID : 365

**EFFECT OF DEFORMATION OF THE GARSELA FAULT  
AND SECONDARY FAULTS ON SEISMIC HAZARDS, CASE  
STUDY: PASIRWANGI DISTRICT, GARUT REGENCY**

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Abstract - The earthquake caused by the Garsela Fault significantly damaged the infrastructure and homes of residents around Pasirwangi District. This fault is in Garut Regency, West Java and is one of the primary sources of earthquakes in Garut. This study aims to calculate surface deformation and interpret its causes by analyzing InSAR data from 2017 to 2021. LiCSBAS, a Python-based time-series deformation analysis program, processed InSAR data to determine fault movement attributes and sources. Geological mapping and analysis of fault kinematics and dynamics determine characteristics and movement movement. The results of time series analysis show that the speed of surface deformation in the Pasirwangi area and its surroundings ranges from -45 mm/year to 35 mm/year. The movement mechanism of normal and right-hand normal faults causes the dominant surface subsidence. The difference in maximum ground movement acceleration between the north and south areas is caused by force moments evenly distributed at building points, influenced by differences in building density in the research area.

Paper ID : 381

**GEOLOGY AND MECHANISM OF GEOLOGICAL  
STRUCTURE FORMATION IN CIMANINTIN AREA,  
SUMEDANG REGENCY, WEST JAVA**

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**Abstract** - The study area is located in the eastern part of the Bogor Zone that has strongly folded. This study aims to determine the formation mechanism of geological structures in the study area. The research was conducted using the geological mapping method, lineament analysis, and geological structure analysis. Based on field observation, there are 12 geological structures developed in the study area. The history of the formation of geological structures in the study area begins in the late Pliocene. At this time, there was tectonic activity that caused the uplift of the Majalengka basin and the formation of geological structures in the form of a series of folds, Cisampih faults, Babakanjawa faults, and Cimanintin I-II faults. The series of folds and reverse faults in the study area have a lineament pattern that tends to orient west-northwest to east-southeast. Meanwhile, the strike-slip faults in the study area tend to have a pattern that is oriented north-northeast to south-southwest and northwest to southeast. The structural pattern is in accordance with the dominant lineament direction from the lineament extraction results on the hillshade map, which is north-northeast to south-southwest for strike-slip faults and west-northwest to east-southeast for folds and reverse fault sequences.







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Paper ID : 292

## **AN INVESTIGATION ON THE CHANGING DISSOLVED ORGANIC MATTER IN CONVENTIONAL DRINKING WATER TREATMENT**

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Abstract - The river, as the primary source of water, may contain natural organic matter (NOM), which is primarily made up of dissolved organic matter (DOM). DOM is a heterogeneous combination of organic substances with varied structures, including dissolved organic matter, microbial byproducts, hormone disrupting chemicals, and so on. The goals of this research are to track the fate of DOM using fluorescence excitation emission matrices (FEEMs) to determine quantitative and qualitative organic matter in the treated drinking water unit treatment. DOM was tracked in a drinking water treatment train that included an equalisation tank, coagulation, flocculation, sedimentation, filtration, and disinfection unit. The organic matter in source water up to treated drinking water treatment was divided into two components using FEEMs and parallel factor analysis (PARAFAC), notably component C1 at (Ex/Em): 230(310)/425 is fulvic acid-like and humic acid-like, having component C2 at (Ex/Em): 230(330)/450(430) as the same component with C1. The DOM characteristic is determined by the raw water characteristics and treatment techniques.

Paper ID : 388

## **CLASSIFICATION OF CORN DISEASES AND PESTS USING FUZZY NAÏVE BAYES METHOD**

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Abstract - Corn is an essential dietary source for both humans and animals. In addition to being a food source, corn has numerous benefits as a manufacturing commodity. The quality of grain crops must be considered in order to minimize the likelihood of disease and pest infestations. Therefore, it is necessary to classify the diseases and pests that attack corn plants so that farmers can control them during the growth period of corn plants. The fuzzy naive Bayes method is a statistical machine learning method that can be used to classify diseases and pests of corn crops based on colour space-transformed digital images. This study aims to classify corn plant diseases and pests using the Fuzzy Naive Bayes method. The digital image data of corn plant diseases and pests is transformed into an RGB (red, green, blue) colour space model. Seven classes of corn plant diseases and pests were classified: leaf rust disease (LRD), downy mildew disease (DWD), leaf blight disease (LBD), Locusta pest (LP), Heliotis Armigera pest (HAP), Spodoptera Frugiperdita pest (SFP), and Non-Pathogenic (NP). Using the Fuzzy Naive Bayes method, the classification model achieves an accuracy of 87.83%, macro precision of 34.91%, macro recall of 35.90%, and macro f-score of 33.82%.



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