



< Back to results | 1 of 38 Next >

🛃 Download 🛱 Print 🖾 E-mail 📆 Save to PDF 🕁 Add to List More... >

Evergreen • Open Access • Volume 9, Issue 2, Pages 484 - 490 • June 2022

Document type Article • Bronze Open Access Source type Iournal

ISSN 21890420 DOI 10.5109/4794176

View more 🗸

Functions of Water Bodies as Mitigation of the Impact of Urban Heat Island in Kampung Luar Batang and Kampung Pulo Geulis

Widayanti, Rina^{a, c} ⊠; <u>Tohjiwa, Agus Dharma^c;</u> <u>Wijayanti^b;</u> ■ Save all to author list

<mark>Setyowati, Erni</mark>^b

^a Doctoral Program in Architecture and Urban Sciences, Diponegoro University, Semarang, Indonesia ^b Department of Architecture, Faculty of Engineering, Diponegoro University, Semarang, Indonesia

^c Department of Architecture, Faculty of Civil Engineering and Planning, Gunadarma University, Depok, Indonesia

22 Views count ⑦ ↗

View all metrics >

🔁 View PDF 🛛 Full text options 🗸 🛛 Export 🗸

Abstract

Author keywords

Reaxys Chemistry database information

SciVal Topics

Metrics

Funding details

Abstract

Uncontrolled urban development can cause urban areas to be warmer than the surrounding rural areas, known as the Urban Heat Island. This study aims to determine the microclimate conditions formed in residential areas that have water bodies and to determine the function of these water bodies as an effort to reduce the temperature of the area. A detailed discussion of temperature, humidity and wind speed shows evidence of an increasing trend in temperature in the area (UHI phenomenon) and shows that temperatures in areas far from the sea and close to rivers are lower than the surrounding areas. © 2022 Novel Carbon Resource Sciences. All rights reserved.

Author keywords

body of water; Microclimate; Urban Heat Island

Cited by 0 documents

Inform me when this document is cited in Scopus:

Set citation alert >

Related documents

Cooling island effect of urban lakes in hot waves under foehn and climate change

Le Phuc, C.L., Nguyen, H.S., Dao Dinh, C. (2022) Theoretical and Applied Climatology

An approach to examining performances of cool/hot sources in mitigating/enhancing land surface temperature under different temperature backgrounds based on landsat 8 image

He, B.-J. , Zhao, Z.-Q. , Shen, L.-D.

(2019) Sustainable Cities and Society

Influence analysis of rural morphological factors on microclimate cooling effect of water body | 村镇形态要素对水 体微气候冷却效应的影响分析

Wu, Y., Peng, C. (2022) Dongnan Daxue Xuebao (Ziran Kexue Ban)/Journal of Southeast University (Natural Science Edition)

View all related documents based on references

Find more related documents in Scopus based on:

Authors > Keywords >

Q

WEB MANUSCRIPT







Source details



View CiteScore methodology ightarrow CiteScore FAQ ightarrow Add CiteScore to your site $c^{
m P}$



Evergreen a

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
Japan Universities and research institutions in Japan	Environmental Science Management, Monitoring, Policy and Law Materials Science Ceramics and Composites Electronic, Optical and Magnetic Materials Surfaces, Coatings and Films	Joint Journal of Novel Carbon Resource Sciences and Green Asia Strategy	15
ICATION TYPE	ISSN	COVERAGE	INFORMATION
ournals	21890420	2014-2021	Homepage How to publish in

SCOPE

"Evergreen - Joint Journal of Novel Carbon Resource Sciences & Green Asia Strategy" is a refereed international open access online journal, serving researchers in academic and research organizations and all practitioners in the science and technology to contribute to the realization of Green Asia where ecology and economic growth coexist. The scope of the journal involves the aspects of science, technology, economic and social science. Namely, Novel Carbon Resource Sciences, Green Asia Strategy, and other fields related to Asian environment should be included in this journal. The journal aims to contribute to resolve or mitigate the global and local problems in Asia by bringing together new ideas and developments. The editors welcome good quality contributions from all over the Asia.

 \bigcirc Join the conversation about this journal

` ∃ Quartiles







Metrics based on Scopus® data as of April 2022



Kyaw Thu 2 years ago

Dear SCImago Team,

Could you update the coverage since the status on SCOPUS is now "Scopus coverage years:from 2014 to Present".

Thanks.

📥 reply

Dear Melanie,

Thank you for your reply. Probably, you are not getting the latest data from SCOPUS since the data on the SCOPUS journal page has updated the coverage already about a month ago.

Cheers!



Melanie Ortiz 2 years ago

SCImago Team

Dear Kyaw,

Thank you for contacting us. SJR is a portal with scientometric indicators of journals indexed in Scopus. All the metadata (Title, ISSN, Publisher, Coverage) have been provided by Scopus /Elsevier and SCImago doesn't have the authority over these data which are property of Scopus/Elsevier. SCImago is not allowed to do any changes of the metadata unless Scopus authorizes it expressly. Keep also in mind that the SJR is a static image (the update is made only one time per year) of a database (Scopus) which is changing every day. Therefore, we suggest you contact Scopus support regarding this matter here:

https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/sc opus/ Best Regards,

SCImago Team



Aaron Berg 2 years ago

Hi, you have 7 metrices (SJR, citation etc), which one has the highest weight in deciding Q? I have seen some journals with SJR > 0.6, yet still Q3.

Thank you.

Aaron

k reply



Melanie Ortiz 2 years ago

Dear Aaron, Thank you for contacting us. You can know further concerning our methodology here: https://www.scimagojr.com/help.php#understand_journals https://www.scimagojr.com/files/SJR2.pdf Several variables must be taken into account to calculate the SJR and Quartiles. There are two important variables that we cannot leave out: -The number of citations is one of those variables but not the only one because it is

weighted by the citations received and where the journal is cited in. It is different if the citations come from highly-cited Journals or not. Imagine that these 5 quotes appear in the most cited Journals. That part of the calculation is no longer worth 5, it is worth much more. This variable is called "authority principle". Therefore, it is important to be cited, but most important is where you are cited.

-The second variable is the subject Category's distribution. If most of the journals categorized in subject category X are cited by lowly-cited journals, the quartile of a journal cited in highly-cited journals will be better than the other ones. Best Regards, SCImago Team



Kyaw Thu 2 years ago

Dear SCImago Team,

How do you get/decide this information: Coverage: 2014-2019?

Thank you.

reply



Melanie Ortiz 2 years ago

Dear Kyaw Thu,

SCImago Team

Thank you very much for your comment. All the metadata have been provided by Scopus /Elsevier in their last update sent to

SCImago, including the Coverage's period data.

Best Regards, SCImago Team



Manoj Kumar Yadav 2 years ago

is it scopus indexxed journal?

k reply



Kyaw Thu 2 years ago

Yes, it is. EVERGREEN is indexed by SCOPUS as of 2021. The current status on the SCOPUS website is refreshed twice a year and the status will be reflected in the next update. Please be noted that a journal is indexed by SCOPUS if one can see the scores under the "CiteScoreTracker".



Melanie Ortiz 2 years ago

SCImago Team

Dear Manoj,

Thank you very much for your comment.

All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2019 was released on 11 June 2020. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day. Best Regards, SCImago Team



Anil Kumar 2 years ago

Citation method not understandable....how to cite for this journal

📥 reply



Kyaw Thu 2 years ago

You can download the .cls file (citation format can be imported to Mendeley) from the following cite.

http://www.tj.kyushu-u.ac.jp/evergreen/submit.php#temp



Melanie Ortiz 2 years ago

SCImago Team

Dear Anil, thank you for contacting us.

Unfortunately, we cannot help you with your request, we suggest you visit the journal's homepage or contact the journal's editorial staff, so they could inform you more deeply. Best Regards, SCImago Team

I'm not a robot	reCAPTCHA Privacy - Terms		
Submit			

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.



EVERGREEN

ENHANCED BY Google

EDITORIAL BOARD



Executive Editor



Subject Editors











Professor Jun TANIMOTO

Department of Advanced Environmental Science and Engineering Faculty of Engineering Sciences Kyushu University, Japan

Assoc. Professor Kyaw Thu

Department of Advanced Environmental Science and Engineering Faculty of Engineering Sciences Kyushu University, Japan

Assoc. Professor Andrew Mark Spring Department of Internationalization and Future Conception Faculty of Engineering Sciences Kyushu University, Japan

Assoc. Professor Osama Eljamal

Department of Internationalization and Future Conception Department of Earth System Science and Technology Faculty of Engineering Sciences Kyushu University, Japan

Assoc. Professor Hiroshi Furuno

Department of Internationalization and Future Conception Department of Molecular and Material Sciences Faculty of Engineering Sciences Kyushu University, Japan

Prof. Michitaka OHTAKI

Department of Advanced Materials Science and Engineering Faculty of Engineering Sciences

Kyushu University, Japan

Assoc. Professor Jin Miyawaki Department of Advanced Device Materials Institute for Materials Chemistry and Engineering Kyushu University, Japan





Regional Editors







Assoc, Professor Nasruddin

Prof. Kiichi HAMAMOTO

Prof. Naoji YAMAMOTO

Faculty of Engineering Sciences Kyushu University, Japan

Faculty of Engineering Sciences Kyushu University, Japan

Department of Advanced Energy Science and Engineering

Department of Advanced Energy Science and Engineering

Department of Mechanical Engineering Faculty of Engineering Universitas Indonesia, Indonesia

Assoc. Prof. Agung Tri Wijayanta Head of International Affairs of Engineering Faculty Head of Doctoral Program in Mechanical Engineering Graduate School of Engineering Sebelas Maret University, Indonesia

Assist. Prof. Muhammad Sultan Department of Agricultural Engineering Bahauddin Zakariya University, Pakistan

Honorary Advisor



Professor Bidyut Baran Saha

Department of Mechanical Engineering Graduate School of Engineering Thermal Science and Engineering Division International Institute for Carbon-Neutral Energy Research Kyushu University, Japan

Editorial Board





Professor Akira Harata

Department of Internationalization and Future Conception Faculty of Engineering Sciences Kyushu University, Japan

Professor Aya Hagishima

Department of Internationalization and Future Conception Department of Energy and Environmental Engineering Faculty of Engineering Sciences Kyushu University, Japan

Professor Kazuhide Ito

Department of Advanced Environmental Science and Engineering

Faculty of Engineering Sciences

Kyushu University, <mark>Japan</mark>

<u>↑</u>]



Evergreen

Joint Journal of

Novel Carbon Resource Sciences & Green Asia Strategy

Volume 09, Issue 02, June 2022

CONTENTS

Anthony Chukwunonso Opia, Mohd Kameil Abdul Hamid, Samion Syahrullail, Audu Ibrahim Ali, Charles N. Johnson, Ibham Veza, Mazali Izhari Izmi, Che Daud Zul Hilmi, Abu Bakar Abd Rahim Tribological Behavior of Organic Anti-Wear and Friction Reducing Additive of ZDDP under Sliding Condition: Synergism and Antagonism Effect	246
Hans Juliano, Femiana Gapsari, Hubby Izzuddin, Toto Sudiro, Krisna Yuarno Phatama, William Putera Sukmajaya, Zuliantoni, Thesya Marlia Putri, Abdul M Sulaiman HA/ZrO₂ Coating on CoCr Alloy Using Flame Thermal Spray	254
Slamet Wahyudi, M. Ridwan F, Putu Hadi Setyarini Effects of Metabolic Heat on The Temperature Distribution of Human Hands Affected by Sarcoma Tumors Given Interstitial Hyperthermia Therapy	262
Sanjeev Kumar Lambha, Vinod Kumar, Rajiv Verma Performance Characteristics of a Deformed 120-Degree Partial Bearing with Couple Stress Lubrication	269
Khoirina Dwi Nugrahaningtyas, Rujito S.R. Suharbiansah, Witri Wahyu Lestari, Fitria Rahmawati Metal Phase, Electron Density, Textural Properties, and Catalytic Activity of CoMo Based Catalyst Applied in Hydrodeoxygenation of Oleic Acid	283
Dawit Gudeta Gunjo, Vinod Kumar Yadav, Devendra Kumar Sinha Performance Analysis of Latent Heat Storage Systems using CuO Nanoparticles	292
Muslihudin Muslihudin, Wiwiek Rabiatul Adawiyah, Eko Hendarto, Ratri Damaryanti Megasari, Muhammad Fadil Ramadhan	
Plant on The Slopes of Slamet Mount, Central Java, Indonesia	300
Mohammad Jahirul Hoque Causes, Mechanisms and Outcomes of Environmental Degradation in Bangladesh: a Study in Sylhet	310
Md. Ahsan Habib, K M Ariful Kabir, Jun Tanimoto <mark>Evolutionary</mark> Game Analysis For Sustainable Environment Under Two Power Generation Systems	326

Performance Characteristics of a Deformed 120-Degree Partial Bearing with Couple Stress Lubrication

Sanjeev Kumar Lambha^{*}, Vinod Kumar, Rajiv Verma

Department of Mechanical Engineering National Institute of Technology, Kurukshetra Kurukshetra, Haryana, India

*Author to whom correspondence should be addressed: E-mail: <u>sanjeev.lambha@gmail.com</u>

(Received February 8, 2022; Revised May 18, 2022; accepted June 4, 2022).

Abstract: The influence of using a fluid with couple stresses as lubricant on the performance of 120° partial bearing is studied here. The effect of variation in liner deformation is also considered. Modified Reynold's equation along with the elasticity equation is solved by using an FEM approach to predict the properties in static and dynamic form. The properties studied are peak pressure, carrying capacity of load, stiffness characteristic, damping characteristics. Based on the results it is concluded that for a deformed bearing liner dynamic performance of 120° partial bearing are enhanced by using the fluid with couple stresses.

Keywords: Couple stress fluid, liner deformation, partial arc bearing, elastohydrodynamic lubrication, static characteristics, dynamic characteristics.

1. Introduction

The classically used lubrication phenomenon is hydrodynamic which plays a major role in the operation of rotating machines. For smooth functioning of interrelated parts of any machine, the journal bearing is a key element used from past decades for transmission of power and to withstand loads between mating parts. The properties of Newtonian lubricant, used classically can be improved by adding some chemical compounds (additives) in the base fluid. The addition of these long chain polymer additives into the Newtonian fluids makes them to be non-Newtonian. One such kind of non-Newtonian lubricant is a fluid with couple stresses popularly known as couple stress fluid. The rheological behaviour in fluid with couple stresses is based on the theory of micro continuum¹⁾ The effect of fluid with couple stresses was studied by many researchers to predict its effects on the performance of journal bearings. The load capacity was improvised, and friction coefficient reduced on addition of polymer particles to lubricants²⁻³⁾. An action of squeezing in bearing with partial arc⁴ was presented by authors for fluid with couple stresses. The load capacity of cylindrical bearing operating with liner deformation and couple stresses were enhanced⁵). The key factors: bearing geometric features, factor of couple stress and magnetic based parameters governs the load capacity and film thickness⁶). The wear and friction near edges decreased by using couple stresses in finite line contacts⁷).

A 3-D elasticity model was used for couple stresses and elasticity parameter to evaluate the static, dynamic and stability characteristics of cylindrical bearing⁸⁾. The rheological effects of a fluid with couple stresses improved the dynamic performance⁹⁾ of hydrodynamic bearings. The influence of textured surfaces observed to be more significant compared to non-textured surfaces for a fluid with couple stresses¹⁰). The load carrying capacity, attitude angle, friction coefficient, side leakage of journal bearing was improved for a combined effect of the turbulence and elasticity of bearing liner¹¹). The new material constant η is completely responsible for the couple stress property of fluid. The effect of variation in viscosity of fluid on bearing performance was studied by many researchers from a long decade. A combined influence12) of viscosity variation, velocity slip and couple stresses studied for pressure and the load capacity. A review study of micropolar fluids, power-law fluids and couple stress lubricants resulted that the non-Newtonian lubricants gives better results compared to Newtonian¹³⁾. The selection of right lubricant with appropriate couple stress properties resulted an enhancement in the stability range and damping abilities¹⁴⁾ for two lobe non-circular journal bearings. A lubrication model considering the effect of misalignment, couple stress and shear thinning impacts the sensitivity of fluid lubrication in proportion to couple stress parameter, such that for an area of minimum film thickness, the sensitivity is maximum¹⁵⁾.

Evolutionary Game Analysis For Sustainable Environment Under Two Power Generation Systems

Md. Ahsan Habib^{1,2,*}, K M Ariful Kabir^{1,3}, Jun Tanimoto^{1,4}

¹Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Kasuga-koen, Kasuga-shi, Fukuoka 816-8580, japan

²Department of Electrical and Electronic Engineering, Begum Rokeya University, Rangpur, Bangladesh ³Department of Mathematics, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh ⁴Faculty of Engineering Sciences, Kyushu University, Kasuga-koen, Kasuga-shi, Fukuoka 816-8580, japan

> *Author to whom correspondence should be addressed: E-mail: emonape@gmail.com

(Received February 22, 2021; Revised March 30, 2022; accepted May 9, 2022).

Abstract: With the rapid prosperity of the global economy and industry, as the energy demand, many factors influence power-producing sectors, including government incentives, customer demand, production cost, eco-friendly, and investors investment. To analyze the cost-benefit-subsidy in power generator system under the evolutionary game setting, we considered two asymmetric game structures by coupling the photovoltaic (PV) power system and coal-fired (CF) power system. To model the asymmetric games for PV and CF, Game-1 considers respective cost and benefit, whereas, Game-2 deliberates cost, benefit, and government subsidy. We present both analytical and numerical approaches within this framework.

Keywords: Evolutionary game theory; power generator system; Government subsidy.

1. Introduction

The Photovoltaic (PV) power system, one of the essential energy systems, implies that this power system can mitigate the power demand. The PV system using the solar potential to power generation provides benefits such as low maintenance, minimum environmental effect, and moderate power generation costs ¹⁻⁹. Besides this, the PV system needs high investment for the installation of the PV panel. Another resource is the coal-fired (CF) power system that meets our demand for energy through power generation 10). For example, coming to the real-world scenario, the power production structure in china, more than 70% of the coal power system 11 . However, the CF system inevitably releases SO₂, dust, CO, etc. As a result, ozone layer destruction, climate warming, acid rain, air pollution, water pollution, and health risks increase day by day. Also, the government plays another vital role in power generation. The government provides subsidies for the PV power system and the CF power system to protect the environment. With the growing fierce global market competition ¹²), PV and CF have supported the market environment and meet consumer needs in their interest. As a result, the coexistence of PV and CF turns into a sustainable advantage in the market environment and social life ¹³).

The evolutionary game theory (EGT) 14) has drawn more attention and has achieved significant development in the past decade. Further, the idea and its application of EGT have been developed rapidly. The more focus of the evolutionary game theory was on the dynamics of strategy (Cooperation or Defection) change as influenced by the various competing systems' in different situations of dilemma game ¹⁵⁻²¹. The essence of the dilemma game precisely describes by Tanimoto and Sagara ²²⁾ in which they investigated and revealed the idea of GID (gambleintending dilemma) and RAD (risk-aversion dilemma) to express the social dilemma game 23-29). Nowadays, evolutionary game theory was widely applied to analyze various gaming behaviors such as firm and industry behaviors, broader biological and dynamical systems, economic growth theory, etc., 30-32) through symmetric and asymmetric games.

In EGT, the symmetric game is a branch of the game in which all the players have the same action, and symmetric payoffs provide in each activity. In contrast, asymmetric games are such types of games in which players do not share their gains equally. Here, different options contract to each player. So, it can be said that the asymmetry games are aroused from the individual differences, phenotype variations such as size, speed, strength, wealth, and

<mark>Shuaibu Alani Balogun,</mark> Mohamad Kasim Abdul Jalil, Jamaluddin Mohd Taib <mark>An Approach to Solution Variants Screening in Morphological Matrix based</mark> <mark>Conceptual Design</mark>	
Anil Kumar, Rakesh Giri, Shivnath Mishra, Niraj Gupta Productivity Improvement of HLLS Using Lean Technique in Assembly Line of an Automotive Industry	356
Vineet Kumar, Sudesh Kumar Garg, Soniya Gupta, Sanjay Kumar Sharma Two Level Storage Inventory Model with Ramp Type Demand under Inflationary Environment with Partial Backordering	
Vaibhav Shrivastava, Vaibhav Diwakar, Manan Sehgal, Mohit Verma, Eram Neha Modelling and Analysis of Hexapod walking Robot	378
Tejas G. Patil, Sanjay P. Shekhawat Artificial Neural Based Quality Assessment of Guava Fruit	
Pankaj Singh Yadav, Vandana Agrawal, J. C. Mohanta, MD. Faiyaz Ahmed A Theoretical Review of Mobile Robot Locomotion based on Mecanum Wheels	396
Pankaj Gupta, Bhagat Singh, Yogesh Shrivastava Robust Techniques for Signal Processing:A Comparative Study	404
Fadlilatul Taufany, Mathilda Jowito Pasaribu, Berlina Yunita Sari Romaji, Yeni Rahmawati, Ali Altway, Susianto, Siti Nurkhamidah, Julfikar Gilang Anfias, Yuliani Mursidah, Desi Fujanita, Susan Yulianti, Dian Rahmawati, Ghea Stellarosari The Synthesis of Activated Carbon from Waste Tyre as Fuel Cell Catalyst Support ♦	412
Adrian Nur, Arif Jumari, Endah R. Dyartanti, Tika Paramitha, Ramadhan S. Irianto, Hevi Ismarlina, Kanindra Prahaspati, Laurencia A. Kurniawan The Release of Hydrogen from NaBH₄ with Ni-Cu-B/Hydroxyapatite as The Catalyst ♦	421
Anisa Raditya Nurohmah, Megadita Ayuningtyas, Cornelius Satria Yudha, Agus Purwanto, and Hendri Widiyandari Synthesis and Characterization of NMC622 Cathode Material Modified by Various Cheap and Abundant Transition Metals for Li-ion Batteries 🔶	427
Himmah Sekar Eka Ayu Gustiana, Firda Reza Agustiana, Shofirul Sholikhatun Nisa, and Endah Retno Dyartanti Synthesis and Characterization of NMC 811 by Oxalate and Hydroxide Coprecipitation Method ♦	438
Hendri Widiyandari, Oki Ade Putra, Risa Suryana, Iqbal Firdaus Highly Porous and Thermally Stable Poly(vinylidene fluoride) Separators : Effects of Solvent and Colloidal SiO₂ Concentration ◆	443

An Approach to Solution Variants Screening in Morpholo gical Matrix based Conceptual Design

Shuaibu Alani Balogun^{1*}, Mohamad Kasim Abdul Jalil¹, Jamaluddin Mohd Taib¹

¹School of Mechanical Engineering, University Teknologi Malaysia (UTM), Johor Bahru, Malaysia

*Author to whom correspondence should be addressed: E-mail: sabalogun@graduate.utm.my

(Received October 27, 2021; Revised June 8, 2022; accepted June 8, 2022).

Abstract: To make morphological matrix based conceptual design more efficient, a systematic procedure which enables complete extraction of the feasible solution variants (concepts) is developed. The approach entails: functional decomposition, generation of alternative solution principles for each subfunction, formation of combinatorial solution variants chains, and 3D space matrix and multi-objective concept optimisation-based concept screening. The approach was tested using the conceptual design of river cleaning machine. 625 theoretical concepts are obtained from the morphological matrix. The concepts are screened to 114 feasible concepts and optimised to obtain a preliminary design concept. Consequently, the concept selected for the river cleaning machine is outstanding based on efficiency, manufacturability, repairability and cost.

Keywords: Feasible concept, solution principle, solution variant, physical parameter, river cleaning machine

1. Introduction

Conceptual design has been accorded the most significant stage in the design process ¹). In fact, 70% of the life cycle cost of products, is influenced by the conceptual design stage ²). For these reasons, sixty to seventy percent of the design cost, is often expended at the conceptual design stage ³). Conceptual design process, can be considered as the transformation of design specification ⁴) -which is given as requirements list- ⁵) into one or more concepts, that can satisfy these requirements for further development ⁶). During the conceptual design phase, design problems are formulated ⁷), possible solutions to the problems are generated ⁸), then the seemingly best solution is selected after evaluating the various solutions variants (SVs) ⁹).

Conceptual design entails three basic tasks. The tasks are concept generation, concept evaluation and concept selection ⁵⁾. Of the many methods of concept generation, morphological matrix approach has proved to be outstanding especially when quantity, variety and novelty ¹⁰⁾ are of concern ¹¹⁾. In a morphological matrix, the design problem is systematically defined in terms of functions and subfunctions which the artefact to be produced is expected to fulfil ¹¹⁾. Then solution principles (SPs) which could be in terms of structures or physical effects, that can perform each subfunction, are proposed for each subfunction ⁵⁾, as shown in Fig. 4. The solution variants (SVs) which are the combinatorial chains of SPs across different rows of the matrix, are the concepts that can

perform the overall function ⁵).

In any morphological matrix with m_1 , m_2 , m_3 , \dots m_x SPs in rows 1, 2, 3, \dots x respectively, the total number of theoretical SVs that could be generated is $m_1 \times m_2 \times$ $m_3 \times - - - m_x^{-12}$. However, not all such SVs are feasible concepts. This is because some of the SPs in the SV chains are not compatible. Pahl et al., ¹² asserted that the morphological approach enables large expansion of the design space. Nonetheless, no logical relation has been developed in the literature, to enable complete exploration of its design space. As such many of the designers that apply the morphological matrix methods employ random sampling of the SVs in concept generation ¹³.

Nevertheless, several attempts were made to develop computer-based SVs exploration for conceptual design ¹¹⁾ ^{14) 15)}. Still, most of them entail manual screening of the SPs either before ¹¹) or during ¹⁵) the SV chain formation. In a study, Arnold, Stone, and McAdams 14) developed an automatic catalogue-based SPs generation method. They developed a system that compare functions and elicit components from the catalogue that matches each subfunction to develop the morphological matrix. However, identifying the SVs that contains incompatible SPs was manually done by designers by screening each of the SVs. Similar to this, are the works of Ölvander, Lundén, and Gavel ¹¹⁾ and Kang and Tang ¹⁵⁾ While the former considered selective assertion of SPs into the morphological matrix, SVs with incompatible adjacent SPs, are manually screened by designers in the later.

Muhammad Nizam, Mufti Reza Aulia Putra, Inayati Heat Management on LiFePo4 Battery Pack for Eddy Current Brake Energy Storage on Rapid Braking Processes I I I I I I I I I I I I I I I I I	
Yusuf Dewantoro Herlambang, Supriyo, Budhi Prasetiyo, Abdul Syukur Alfauzi, Totok Prasetyo, Marliyati, Fatahul Arifin Experimental and Simulation Investigation on Savonius Turbine: Influence of Inlet-Outlet Ratio Using a Modified Blade Shaped to Improve Performance ♦	
Ananda Reno Andi Bahar, Ardiyansyah Saad Yatim, Elang Pramudya Wijaya CFD Analysis of Universitas Indonesia Psychrometric Chamber Air Loop System ★	
Ahmad Fauzi, Latifa Hanum Lalasari, Nofrijon Sofyan, Alfian Ferdiansyah, Donanta Dhaneswara, Akhmad Herman Yuwono Titanium Dioxide Nanosheets derived from Indonesian Ilmenite Mineral through Post-Hydrothermal Process ★	
Luqyaanaa Mursyidah Zahra Ash-Shalehah, Cindy Anggraeni, Evani Gloria, and Dianursanti Development of Microalgae-microbial Fuel Cell (MmFC) Technology using Microalgae Consortium of Chlorella vulgaris and Spirulina Platensis ★	476
Rina Widayanti, Agus Dharma Tohjiwa, Wijayanti and Erni Setyowati Functions of Water Bodies as Mitigation of the Impact of Urban Heat Island in Kampung Luar Batang and Kampung Pulo Geulis ★	
Era Restu Finalis, Joni Prasetyo, Nurdiah Rahmawati, Tyas Puspita Rini, Zulaicha Dwi Hastuti, Novio Valentino, Semuel Patisenda Development of Bio-CSTR Design For Bio-H ₂ From POME As Renewable Fuel ★	491
Vidya Adnina Gandhari, Meka Saima Perdani, and Heri Hermansyah Improvement on Reusability, Storage Stability and Thermal Stability of Magnetic Graphene Oxide-Immobilized Cholesterol Oxidase ★	500
Aulia Izzuddin Laksono, Fauzan Hanif Jufri, Catur Apriono Fiber Bragg Grating Sensor Simulation for Corona Discharge Temperature Sensor ★	506
Basari, Alexander Prasetyo Gait Analysis Parameter Study Using Xbox Kinect Aimed at Medical Rehabilitation Tool ★	
Muhammad Haikal Rasyad Utomo, Reza Miftahul Ulum, Agus Budi Prasetyo Effect of 10, 20, 30, 40 wt% MgO addition on Ferronickel Slag Roasting to Produce Raw Materials for Refractory ★	
Sunaryo Sunaryo, Muhammad Athallah Aidane Development Strategy of Eco Ship Recycling Industrial Park ★	

Muhammad Miqdad, Anne Zulfia Syahrial Effect of Nano Al ₂ O ₃ Addition and T6 Heat Treatment on Characteristics of AA 7075 / Al ₂ O ₃ Composite Fabricated by Squeeze Casting Method for Ballistic Application ★	531
Antony Sihombing, Akmal Kurnia Ramadhan, Cut Sannas Saskia Accessibility and Permeability in Transit Area. Case Studies in Jakarta-Depok Train Stations ★	538
Hari Nurjaman, Suwito Suwito, Dwi Dinariana, Gambiro Suprapto, Bambang Budiono, Martinus Fau Development of Numerical Model of a High Performance Precast Concrete System Equipped with Base Isolation ★	547
Warjito, Oimolala Putrawan, Budiarso, Ridho Irwansyah, Sanjaya BS Nasution gThe Numerical Study of the Effect of Blade Depth and Rotor-Basin Ratio on Vortex Hydro Turbine Performance ★	556
Bambang Priyono, Baron Rifky, Frida Zahara, Ahmad Subhan Enhancing Performance of Li4Ti5O12 with Addition of Activated Carbon from Recycled PET Waste as Anode Battery Additives ★	563
Ratu A Kusumawardhani, Kemas R Kurniawan, Susanto Zuhdi Between Sacred Nagara and Resilience Planning: The Transformation of Banten Port City in the 16th to 17th Century ★	571
Wina Libyawati, Gandjar Kiswanto, Agung Shamsuddin Saragih, <mark>Tae Jo Ko</mark> The Influence of Flexure Variation to Vibration-Assisted Micro-Milling Device by Using Finite Element Analysis ★	577
Safril, Mustofa, Muhamad Zen, Fredy Sumasto, Mohammad Wirandi Design of Cooling System on Brushless DC Motor to Improve Heat Transfers Efficiency ★	584
Yanita Mila Ardiani, Kemas .R Kurniawan, Yulia Nurliani Lukito The Gap on Architecture Conservation Regulations from Colonial until Postcolonial Era in Indonesia ★	594
Irfan Purnawan, Levana Wibowo, Annisa Faiza Ramadhani, Woei Jye Lau, Arifina Febriasari, Sutrasno Kartohardjono The Feed Gas Flow Effects on the NOx Removal Performance through the Polyvinylidene Fluoride Hollow Fiber Membrane Module using H₂O₂ and HNO₃ as an Absorbent ★	601

◆ The International Conference on Energy Storage Technology and Applications 2021 (ICESTA-2021)
 ★ The 17 th QiR (Quality in Research) 2021

The Influence of Flexure Variation to Vibration-Assisted Micro-Milling Device by Using Finite Element Analysis

Wina Libyawati¹, Gandjar Kiswanto^{1,*}, Agung Shamsuddin Saragih¹, Tae Jo Ko²

¹Mechanical Engineering Department, Universitas Indonesia, Depok, Indonesia

² School of Mechanical Engineering, Yeungnam University, Gyeongsangbuk-do, Gyeongsan-si, South Korea

* Author to whom correspondence should be addressed: E-mail: gandjar_kiswanto@eng.ui.ac.id

(Received February 11, 2022; Revised June 20, 2022; accepted June 20, 2022).

Abstract: This paper presents a compact method to predict the amplitude displacement and evaluate the influence of flexure structure on the vibration-assisted micro-milling device. The voltage load and flexure dimension variation are applied to the Finite Element model to obtain the predicted amplitude displacement. The simulation results show that amplitude displacement increases linearly along with the voltage load, but the influence of flexure thickness shows a varying trend on the amplitude displacement. The method can predict the device's amplitude displacement and movement pattern and is suitable for determining the optimum design for the vibration-assisted micro-milling device.

Keywords: amplitude displacement; Finite Element; flexure; piezoelectric actuator; vibrationassisted micro-milling

1. Introduction

The micro-milling process development leads to vibration-assisted micro-milling. The vibration-assisted micro-milling has been proven through simulation and experiment studies in the past decade that it improved the machined surface quality on a wide range of material properties ¹⁻⁶. The tool path trajectory is the primary performance of vibration-assisted micro-milling. During its application, the tool path, which is a linear path, becomes zig-zag or elliptical during the machining process.^{7–9}. It will cause interrupting cutting that ignites an additional cooling period. The piezoelectric actuator is the main component of the device, which is operated by setting up the amplitude displacement and frequency^{10–13}. Flexure or beam structure works with the actuator to achieve the designated displacement ^{14–23}.

During machining, the amplitude displacement output from the piezoelectric actuator ranges between 0-10 micrometres and works based on the actuator material properties^{24,25}). Several studies show amplitude displacement can be measured using displacement sensor^{26,27)} or predicted using Finite Element Analysis (FEA)²⁸⁻³¹⁾. The measurement method is more accurate than the prediction ones, but this method requires high investment in the micro displacement sensor and the ultrasonic-assisted micro-milling device prototype. The FEA method can predict the character and behaviour of the vibration-assisted micro-milling device at the early stage of design procedures. However, the FEA method, which considers the electromechanical constitutive model for the piezoelectric actuator material and the flexure characteristic, is limited to only a specific actuator.

The technology development for the micro-milling process and the actuator requires a compact method to achieve an optimum design of vibration-assisted micro-milling. Linear dynamic simulation is a solution to form a method because the amplitude displacement from the actuator is transmitted to flexure in the induction force³²⁾. Therefore, the amplitude displacement can be predicted with a compact method to achieve optimum design and suppress the experimental cost. Also, at the same time, the method can investigate the influence of the energy source to trigger the piezoelectric actuator and its component.

2. Methodology

Force calculation and linear dynamic simulation are the applied methodology for this study. The force calculation uses an analytical study by converting the voltage load from a single piezoelectric actuator into the induction forces³²⁾. The natural frequency of the piezoelectric actuator is simulated with modal analysis, as shown in Fig.1, based on its material properties, PZT4. The linear dynamic simulation uses the force calculation result as a part of the sinusoidal load function with the input parameter, as stated in Table 1. The induction force is applied in two directions to the head block components: on the feed and perpendicular to the feed direction.