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The Effect of Mewis Duct Energy Saving Device to Propeller Performance

Trimulyono A. ; Mulyatno I.P.; Rachmat A.F.
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Abstract

Installation of ESD (Energy Saving Device) can improve ship propulsion performance. Mewis Duct is one type of ESD (Energy Saving Device) multi-component device that combines nozzle and fin into the nozzle. The structure can minimize losses due to small losses at the ship 's stern and rotational losses or loss of thrust in the slipstreams area. Mewis Duct can reduce power by about 3-8% and increase thrust on the propeller by about 2-5%. This study aims to improve the performance of the INSEAN e779a propeller type using Mewis Duct. The modified Mewis ducts are the number of fins four, five, six asymmetrical and four symmetrical fins using the computational fluid dynamics (CFD) approach. The CFD code is based on the RANS (Reynolds - Averaged Navier Stokes) equation with the turbulent model is k-ϵ. This study found that installing Mewis duct as ESD in a ship increased the propeller thrust by 3-5% and the torque by 3-4%. © Published under licence by IOP Publishing Ltd.

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The 4th International Conference on Environment, Sustainability Issues and Community Development

"Supporting the Realization of Zero Carbon Environment by Implementing Circular Economy"

Registration Schedule & Payment

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On behalf of the committee, I would like to express my sincere gratitude to all colleagues, professors, lecturers, researchers, and welcome you all to the 4th INCRID 2022 "Supporting the Realization of Zero Carbon Environment by Implementing Circular Economy". This conference provides a great opportunity for researchers, students, industries, and governments to communicate their research results on the fundamentals and application of sustainability issues and community development.

INCRID 2022 was held on 1 September 2022 in the online system and the theater room 5th floor of the Faculty of Engineering Diponegoro University, Semarang (hybrid). Keynote and invited speakers were Prof. Ramaraj Boopathy Nicholls State University, USA, Dr. Premakumara Jagath (Institute for Global Environmental Strategies, Japan), Prof. Pau Loke Show (University of Nottingham Malaysia), Prof. Sudharto P. Hadi, MES, Ph.D. (Universitas Diponegoro, Indonesia), Prof. Ir. Tjandra Setiadi, M.Eng., Ph.D. (Institut Teknologi Bandung, Indonesia), Prof. Dr. Soraya Heuss-Aßbichler (Ludwig-Maximilians-Universität München, Germany).

At this conference we have contributions from seven countries. We received about 118 submissions of papers for presentation at this meeting. Each paper was evaluated by a reviewer and about 85 of these are accepted for presentation, divided into 12 parallel presentation sessions. The topics of this conference include Environmental, Health and safety; environmental science, technology, and education; Green infrastructure; and Energy Conservation and Efficiency. It is my hope that the 4th INCRID 2022 will be able to achieve its objective of creating an international forum for researchers, students, industries, and governments to communicate their research results, to share and exchange ideas on the fundamentals and application of environmental, sustainability issues, and community development.

By bringing up this theme, the Department of Environmental Engineering and the INCRID 2022 Committee want to support the efforts of the World to achieve the goal of emission reduction and Net Zero Emission (Carbon neutrality). Furthermore, this activity is expected to support efforts to implement the concept of the circular economy.

Last but not least, my deepest gratitude goes to the Advisory Board, Organizing Committee, International Scientific Committee, institutions, companies, and volunteers who have directly and indirectly supported the success of this conference. Although we try our best to be professional, on behalf of the committee, we request you to accept our sincere apologies for any inconvenience.

Dr. Yustina Metanoia Pusparizkita, S.T., M.T.
Chairman of the 4th INCRID 2022

NAME OF THE EVENT

The 4th International Conference on Environment, Sustainability Issues and Community Development 2022 (4th INCRID 2022)

THEME

"Supporting the Realization of Zero Carbon Environment by Implementing Circular Economy."

The topics of the conference are as follows.

A. Environment, Health, & Safety

– Environment, health, and safety system
– Environmental modeling and computation
– Risk analysis

B. Environmental Science, Technology, and Education

– Waste management and treatment
– Water and wastewater engineering
– Environmental education

C. Green Infrastructure

– Life cycle assessment
– Green building and technology option

D. Energy Conservation and Efficiency

– Clean and renewable energy
– Climate change and global warming

OBJECTIVES OF THE EVENT

The objections of INCRID 2022 are as follows:

- To create an international forum for researchers, students, industries, and governments to communicate their research results on the fundamentals and application of environment, sustainability issues, and community development.
- To share and exchange ideas, thoughts, and discussions on all aspects of the environment, sustainability issues, and community development.
- Facilitate the formation of networks among participants to enhance the quality and benefits of research and development.

PARTICIPANTS

This international conference is open to academicians, researchers, students, and professionals worldwide.

SPEAKERS

Keynote Speakers

No	Name	Institution and Country
1	Prof. Ir. Tjandra Setiadi, M.Eng., Ph.D	Institut Teknologi Bandung, Indonesia
2	Prof. Sudharto P. Hadi, MES, Ph.D	Universitas Diponegoro, Indonesia
3	Prof. Dr. Soraya Heuss-Aßbichler	Ludwig-Maximilians-Universität München, Germany
4	Prof. Pau Loke Show	University of Nottingham, Malaysia
5	Dr. Ramaraj Boopathy	Nicholls State University, USA
6	Dr. Premakumara Jagath	Institute for Global Environmental Strategies, Japan

SCHEDULE

1st Round Submission

Deadline for Abstract Submission	7 June 2022
Notification of Abstract Submission	9 June 2022
Deadline for Full Paper Submission	23 June 2022
Review Result	1 July 2022
Revised Paper Submission	9 July 2022
Deadline for Registration and Payment	23 June 2022

2nd Round Submission

Deadline for Abstract Submission	10 July 2022
Notification of Abstract Submission	12 July 2022
Deadline for Full-Paper Submission	26 July 2022
Review Result	2 August 2022
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Presentation File Submission

(28th August 2022)

Conference Day

(1st September 2022)

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The Effect of Mewis Duct Energy Saving Device to Propeller Performance

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Abstract. Installation of ESD (Energy Saving Device) can improve ship propulsion performance. Mewis Duct is one type of ESD (Energy Saving Device) multi-component device that combines nozzle and fin into the nozzle. The structure can minimize losses due to small losses at the ship's stern and rotational losses or loss of thrust in the slipstreams area. Mewis Duct can reduce power by about 3-8% and increase thrust on the propeller by about 2-5%. This study aims to improve the performance of the INSEAN e779a propeller type using Mewis Duct. The modified Mewis ducts are the number of fins four, five, six asymmetrical and four symmetrical fins using the computational fluid dynamics (CFD) approach. The CFD code is based on the RANS (Reynolds - Averaged Navier Stokes) equation with the turbulent model is k-ε. This study found that installing Mewis duct as ESD in a ship increased the propeller thrust by 3-5% and the torque by 3-4%.

1. Introduction

The energy-saving device (ESD) is one of the ways to increase propeller performance by adding the device to the propeller or ship. ESD can minimize energy loss caused by propeller performance which can reduce energy loss imposed on a propeller performance, then improve ship performance. The study of ESD was performed by Trimulyono et al. for propeller B-series with the combination of ESD [1]. Later, The study was carried out with some variations in angle and fin diameter of PBCF [2]. The study of propeller B-series was conducted in open water schema using computational fluid dynamics (CFD) by Agung and Anita [3]. In addition, a comparison of blade area B-series propeller was conducted by Putra et al. [4]. Moreover, the study of propeller B-series in different advanced coefficients was performed by Fitriadi et al.[5]. Recently, a comparison study of propeller B-series with Kaplan using PBCF was conducted by Berlian et al.[6]. Furthermore, the study of the effect of the incline angle of PBCF using the B-series was performed by Akbar and Utama [7]. The previous research showed B-series propeller was commonly used to perform propeller studies because the empirical data was available compared to other propeller types. It was demonstrated many studies were performed for PBCF with B-series. However, there is a lot of ESD available in the market, such as Mewis duct, hull vane, vortex fin generator, etc.

The present study aims to improve propeller performance by installing the Mewis duct on the propeller. Propeller INSEAN e779a was used in this study, the study was carried out with CFD based on the volume of fluid method (VOF). The velocity advanced was based on the velocity speed service of the Kriso Container Ship (KCS). In addition, there are four combinations of Mewis duct, i.e., Mewis

New risk assessment and prioritization failure modes based approach in a gas turbine system

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Abstract. The dependability occupies a strong place in the performance achievement of the system. It describes the mechanisms that lead to failures of systems. Failure mode and effects, analysis (FMEA) is a classical safety technique widely used in several safety critical industries. This method uses the risk priority number (RPN) to assess the criticality value and prioritize failure modes. However, it suffers from some drawbacks regarding the situation where the in-formation provided is ambiguous or uncertain. Thus, in this work, a fuzzy criticality assessment based approach is carried out to evaluate the failure modes of the relevant system and gives an alternate prioritizing to that obtained by the conventional method. In addition, a novel hybrid approach is proposed that combines the grey relational approach (GRA) and fuzzy analytic hierarchy process. This approach offers a new ranking of failure modes by solving the shortcoming concerning the lack of established rules of inference system which necessitate a lot of experience and shows the weightage or importance to the three parameters severity, detection, and frequency, which are considered to have equal importance in the traditional method. A real case study from a gas turbine system provides encouraging results regarding the risk evaluation and prioritizing failures mode with handling different forms of ambiguity, uncertainty, and divergent judgments of experts.

1. Introduction

Failure mode and effect analysis (FMEA) is vastly employed as an analytical methodology for recognizing , ranking, and reducing different failures modes[1]. For such failure mode, three criticality factors: severity (S), non-detection (ND), and frequency (F) are assessed, and a risk priority number (RPN) is computed by multiplying these factors to evaluate the risk value[2] [3, 4].

Moreover, it demonstrates in different of applications that the FMEA still has many flaws. First, different integration of severity, detection, and frequency factors can provide an equal RPN value. While, the risk assessment for the different criticality can be wildly different. Second, in the

The effectiveness of EM4 and Local Micro-organisms (LOM) Activators in Organic Waste Processing in Brikama Market West Coast Region, The Gambia

Babucarr Jassey[1,2*], **Syafrudin**[1], **Badrus Zaman**[1], **Kemo Ceesay**[2], **Ibrahim Touray**[2], **Juma Ngum**[2], **and Habibi Prakoso**[1]

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Abstract. Compost is the result of decaying process of organic materials due to the interaction between decomposing microorganisms found within. Compost is a type of organic fertilizer that originates from decomposed organic materials. Observations at Brikama Market indicated 20 vegetable vendors with at least 5 pieces of vegetables decaying, market sales decline by approximately 5 kg for every transaction. This study aims to determine the effectiveness of organic waste treatment using EM4 and LOM. This research is purely experimental, uses Posttest Group design and Independent Sample T-Test. This research was conducted in groups, with different forms of waste-treatments which included the use of EM4 and local microorganism activators and observed as it decays. The results obtained differences in the average processing of organic waste using EM4 and LOM activators. The average temperature of EM4 activator 29.89˚C while LOM 29.97˚C. The average humidity 48.67 for EM4 activator while LOM 49.64 and the average pH of EM4 activator 5.96 while LOM 5.43. The research revealed significant changes in EM4 and LOM activators seen from the measurement of temperature, humidity and pH. It is recommended to the community to participate in managing waste, especially organic waste by making compost using EM4 and LOM activators.

1. Introduction

Waste according to Jassey et al., is something that is not used, not intended to be used, disliked, intended to be thrown away or something that is thrown away that comes from human activities and does not happen by itself [1]. The research conducted by Wang et al. [2] on renewable hydrogen production from municipal solid waste. The results of the study concluded that composting of various types organic waste has shown differently the effectiveness of the composting process. Composting is purely conducted on organic waste matter. It has been proven significantly reduce the volume inside country and provide solutions for agriculture as a substitute for fertilizer chemical fertilizers. This also has a similar findings with that of [3].

Other studies conducted by Kohlstock and Kraft [4] in the European Union found that organic waste that was converted into compost could be very beneficial for farmers. The process of recycling organic waste provides economic benefits for the community to mobilize unused waste.

Data from the environment unit of Brikama Area Council states that the estimated comparison data from 2017-2021, lagging waste produced in various places, namely Brikama Town 314,225.00m³/day,

Environmental impact assessment approach to dynamic safety evaluation : a liquefied natural gas plant case study

Abderraouf Bouafia[1*], Mohammed Bougofa[2], Bilal Zeroauli[1], Rabeh Kharzi[3], Ammar Chakhrit[4], Amin Baziz[2], Salah Aberkane[5], Mohamed Salah Medjram[1], Ahmed Mebarki[6]

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Abstract. Industrial discharges pose global ecological risks. This study investigates Algeria's GL1K (gas liquification complex of Skikda) plant's hazardous effluents. The impact assessment evaluates the environmental repercussions of the researched facilities, including the effects on populations and their way of life. Thus, it is possible to stress suggestions to improve facility design to remove or restrict negative effects and to minimize or compensate for the current facility's unfavorable repercussions. This technique is consistent with establishing and monitoring the industrial plant's environmental management system. The method utilized to determine impacts in this EIA can be used to evaluate the EMS's significant aspects and effects and provide improvement options. An evaluation matrix can rate impacts, the grid and criteria are based not regulation but on "good practices" for this type of assessment, and results obtained from modelling the effects using PHAST software. Therefore, they can be modified to fit the facility's activity. Based on examining activities and identifying elements likely to interact with the environment, environmental aspects are identified using the proposed grid and criteria. This study describes a section-by-section approach. Each determined environmental impact can be graded based on environmental factor criteria.

1. Introduction

Skikda is one of the most important industrial ports in Algeria. The Port Enterprise of Skikda as well as EGZIK (Skikda industrial zone management company) keep records of all cases of major accidental pollution [1]. Several accidents have been recorded, mainly, hydrocarbon pollution are the primary sources of pollutants generated by routine operations. Pollutant discharge rules impose stringent limitations on the concentrations of contaminants that can be released [2]. There may be additive or synergistic harmful effects of industrial effluents on humans, animals, and marine life [3]. Air, soil,

Bibliometric Analysis of Thermal Comfort and Sleep Quality Research Trends in Indonesia

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Abstract. Using a bibliometric analysis of the publication output associated with research on thermal comfort and sleep quality in Indonesia during the ten-year period 2012–2022, the purpose of this study was to describe current trends and future research areas. The database Scopus was queried for information covering the years 2012 to 2022. We analyzed selected documents containing "thermal comfort," "Indonesia," and "sleep quality" as part of the title, abstract, or key words and reported the following parameters: publication output trends, cooccurrence, author institution, author key words, and index key words. We utilized Visualization of Similarities (VOS) viewer to analyze the files of a bibliographic database in which five co-occurrences occurred. Air conditioning, ventilation, and the tropics accounted for three main cluster of thermal comfort in Indonesia. Meanwhile, in the sleep quality, the main cluster consisted of human, adult, and major clinical study. This study provides a bibliometric analysis demonstrating that, over the past 26 years, the annual number of publications pertaining to sleep quality in Indonesia has increased at a significantly faster rate than literature on thermal comfort. The latest keywords (trend) of thermal comfort are energy efficiency, temperature effect, and field measurement. In the sleep quality topic, the latest keywords are pandemic, controlled study, and Pittsburgh Sleep Quality Index (PSQI).

1. Introduction

Sleep is primarily a behavior. The identification and classification of sleep was based on changes in posture, continued behavior throughout sleep, and an enhanced arousal threshold [1]. A third of the day is devoted to sleep [2], which is an essential daily activity for maintaining good health [3]. A quality night's sleep allows the body to recuperate and prepares them for the day ahead. Sleep is necessary for relieving physical and psychological exhaustion [4], enhancing work performance, and preserving wellness at both school and work [5]. During a typical sleep time, a person has four to six sleep cycles [6]. A newborn requires 12–18 hours of sleep. Between the ages of 5 and 10, children have a 10-hour sleep demand. As teenagers need around 8 and 9 hours while adults need around 7 and 8 hours, the