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Comparative Analysis of B-Series, Au-Outline Gawn Series and Kaplan Series Propeller on Trimaran Ship using Computational Fluid Dynamics Method

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Abstract

The propeller on a trimaran vessel requires some special criteria such as large thrust value, low-pressure value, and a smooth flow of propellers. This study has focused on the comparison of three types of propellers namely B-series, Au-Outline Gawn Series, and Kaplan series by considering some aspects of propeller diameter, number of blades, skew angle, and pitch. The numerical analysis was made by using Computational Fluid Dynamics (CFD) program to evaluate the performance of the propeller configurations. The result shows that Kaplan Series have the thrust value of 455628 N, the torque value of 96456.6 Nm, the pressure average value of 18608.92 Pa. According to the numerical results, it can be concluded that Kaplan series have a better performance compares with AU-Outline Gawn Series and B-Series for the Trimaran Ship.

Keywords: B-series propeller, AU Outline Gawn series propeller, Kaplan Series Propeller

INTRODUCTION

Indonesia is an archipelagic country which has a wide water area and potential as one of supporting economic growth. One of the most important means of transportation in supporting the economy in the field of transportation is the ship.

The Trimaran is a Multihull ship. Multihull ship is a type of ship that has a hull more than one hull, therefore, Trimaran means to have 3 pieces of the hull. Such a design can raise the Center of Gravity and the Center of Buoyancy so as to have high stability, [1]. In addition to the Center of Gravity and the Center of Buoyancy, speed is also greatly noted in multihull ship design. Therefore, the type of propeller that can produce a good ship speed but with a small vibration is preferred.

The types of propellers will be analyzed using the CFD method to find out whether the experimental test and the CFD are not much different and also know the most effective and efficient type of propeller in its use on a trimaran vessel.

The types of propellers used in the comparison are Au-Outline gawn series, B-Series, and Kaplan series. This comparison is aimed to determine the level of matching on ship KRI Klewang I.

Considering the subject matter of the background, several problem formulations can be taken as follows.

- Determination of the magnitude of the resulting thrust, on the propeller blade and the turbulent flow form of each trimaran ship propeller design
- Comparison of thrust, pressure and torque performance from B-Series propeller variations, Au-Outline Gawn Series, and Kaplan.
- Determination of the most effective type of propeller in its use on trimaran vessels with variations available.
- Based on the above background then the purpose of this study are:
- To know the value of thrust, streamline, and pressure that occurs on each type of trimaran ship propeller.
- To find out the comparison of the variation of B-Series propeller, Au-Outline Gawn Series, and Kaplan on a trimaran ship.
- To obtain optimum propeller type to improve trimaran ship efficiency

Paternal Attachment, Role Identity, and Father Involvement in Parenting

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Abstract

This study examined the structural relationship among a father's attachment to parents, a father's role identity, and father involvement in parenting. A total of 174 fathers with 3-5 aged child participated in this study. To examine the hypothesized model, structural equation modeling was used. Data were analyzed with SPSS and AMOS programs. The results suggested that a father's attachment to his parents is associated with a father's role identity and father involvement in parenting. Father's role identity positively related to father involvement in parenting. Father attachment to his mother has an indirect effect on his involvement in child rearing via his role identity. This study highlights the importance of secure attachment experience in early childhood and preparing for fatherhood to promote fathers' involvement in parenting.

Keywords: paternal attachment to parents, father's role identity, father involvement

INTRODUCTION

The ratio of men taking paternity leave increased 42.4% from 2014 to 2016. [1] The dramatic increase in the number of mothers in paid work and the rapid decrease in the number of children has induced the father to participate in child care. As more women continue to participate in the workforce, fathers in dual-income families are forced to take care of their children. Another reason is that societal expectations for fathers have changed; Fathers were expected to be responsible for bread-winning roles in the traditional view; However, fathers are expected to be more actively involved in the care of and closely interacting with their own children in recent decades. [2] Simultaneously, the level of fathers' interest in child rearing and child education has increased [3]; Still a minority of fathers are actively and voluntarily involved in child care with pleasure.

Changes in Korean family and societal patterns have drawn attention to studies on the trends of father involvement in child rearing and on predictors of father involvement. [4] Studies have been in progress on the facilitators and barriers for fathers to promote involvement in raising their children. [5] Previous studies consistently reported that father involvement in parenting had a positive impact on their children's overall development. [6-7] In other words, child development is affected by the quantity and quality of father involvement in their care. [8] For example, children of involved fathers are

likely to show more cognitive competence [9] and to set positive attitudes toward school. [10] Also, a high level of father involvement predicted their children's well-being. [11]

Even though Korean fathers have tried to participate in child rearing lately, they have difficulty interacting and playing with their children. Since they couldn't prepare for being a father, it was not easy for them to establish their role as a father. Being a father requires a significant lifestyle shift; one's established identity as a man should be reset as a father. [12] The father's role identity means how a father sets his role as a parent. [13] Many studies show the father's role identity is associated with his own involvement in parenting. [14] A father's attitudes toward the parenting role and the job environment play an important role in determining his level of involvement in child rearing. [15] Fathers with a high level of role confidence are more likely to perceive the significance of fatherhood and value fatherhood as a satisfying experience. [16]

Also, one's secure attachment relationship with one's own parents is related to one's positive parenting. The study of the intergenerational transmission of parental attitudes and behaviors [17] reported that parents are likely to transmit their parenting behaviors to their children. Also, the studies on the links between self-reported attachment styles and parenting indicated that the parent's insecure attachment experience was related to less sensitive, supportive, and responsive parenting behavior toward their children. [18]

Furthermore, an attachment relationship with one's own parents could have a continuous impact on multiple roles as individuals become adults. For example, individuals with insecure attachment reported greater concerns about their family life, romantic relationships, and parenting than did those who experienced secure attachment relationships. [19] Secure attachment to parents was also associated with secure fathering. Fathers who rated themselves as secure had low levels of parenting stress and high levels of parenting efficacy and knowledge of child development. [20]

Based on these previous studies, this study was to examine the relationship between paternal attachment to parents, role identity, and father involvement in parenting as well as the mediating effect of the father's role identity in the relation between paternal attachment and father's involvement in parenting (See Fig 1).

Experimental Optimization of Nanostructured Nickel Oxide Deposited by Spray Pyrolysis for Solar Cells Application

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Abstract

This study focused on the experimental optimization of nanostructured nickel oxide (NiO) for solar cell applications. The optimization procedure involved the variation of the precursor concentrations of nickel acetate with attendant measurement of the properties of nickel oxide films. The films were spray deposited on glass substrate. Nickel acetate precursor was used at a substrate temperature of 350 °C. Precursor concentrations were: 0.025 M, 0.05 M, 0.075 M and 0.1 M respectively. The surface morphology revealed nanostructured film with particles densely distributed across the substrate's surface. The films are homogeneous, smooth, well adherent and devoid of pinholes and cracks. The morphology became grainier as the precursor solution increased. Elemental composition exposes the presence of Ni and O elements in NiO film. Oxygen concentration decreases as precursor solution increases. The film structural property reveals that deposited NiO film has an amorphous structure at 0.025 M while the other concentrations are polycrystalline in nature with cubic structure. X-ray diffractometry (XRD) further reveals that the intensity of NiO films increases with increased molarity. Preferred orientation was along the (1 1 1) peak with minor intensity along the (2 0 0) peak. XRD patterns have peak diffraction at ($2\theta = 37^\circ$ and 43°) for the (1 1 1) and (2 0 0) planes respectively, and 64° for the (2 2 0) plane for 0.1 M. Crystallite size was obtained at 63.77 nm maximum. Film thickness increased with increasing precursor concentration from 6.277 μm to 11.57 μm . Film micro strain was observed to have compression for all precursor solutions. Optical studies showed that transmittance decreased with increasing concentration from 80 % to 71 %. Optical band gap energy was between 3.94 eV to 3.38 eV as precursor concentration increased, revealing the effect of varied concentrations on NiO film properties. Optimized results obtained are precursors in the development of low cost, efficient, durable solar cell fabrication for developing countries.

Keywords: NiO; solar cell material; annealing, low income

INTRODUCTION

The provision of affordable and efficient energy is among the top 50 grand challenges facing humankind in the 21st century [1-2]. Electricity is non-existent for over 20 % of the world's population with developing countries comprising 99.8 % of that number [3]. Sub-Sahara Africa is home to nearly 85 % of the 1.3 billion people living in developing countries without access to electricity [4], with an estimated electrification rate of

around 32 % [5]. Several countries in Africa and south Asia lack access to electricity [6], while many countries on those continents have a high degree of electricity supply disruption with an average of less than four hours of power supply daily [7]. However, developed countries like in Europe, America and Asia have turned their fortunes around in terms of electricity generation by harnessing power from renewable energy sources.

Apart from the stable supply of electricity, other attendant challenges still loom in such regions. They include the relatively high cost of electricity, underdeveloped infrastructure especially in remote areas, uneven billing of electricity, high tariffs, and unfavorable policies to mention but a few. This has caused many citizens to resort to alternate sources of electricity supply. Renewable energy has been confirmed as a viable solution to ending global electricity problems as it exceeds world energy demand [8]. Renewable energy is sustainable and not harmful to the environment. Solar energy is a good source of renewable energy [9]. The hourly solar influx on the surface of the earth surpasses annual human energy needs [10]. Solar energy is environmentally benign [11-12]. About 40 % of CO₂ emissions is saved per year for each 1 % of world electricity demand supplied by solar grid [13]. However, high costs are militating against the successful deployment of solar technology worldwide. Solar cells are an integral aspect of solar energy [14].

Large scale production at affordable cost is being studied for the purpose of fabrication of solar cells [15]. Existing methods are not suitable for scaling up due to the expensive nature and complexities associated with the vacuum environment required for fabrication. Nanostructured metal oxide, however, is promising. Nanostructured materials offer potential improvement in solar cells efficiency and reduction in manufacturing and electricity production costs [16] due to the increased surface area to volume ratio of nanoparticles. This makes nanostructured materials more efficient and better energy collectors [17]. Nanostructured materials have unique characteristics that cannot be obtained from conventional macroscopic materials [9]. The drawback of conventional materials is low absorption properties resulting in low efficiency in solar cell devices. Inorganic semiconducting materials are economical, environmentally friendly and viable sources for solar cells [18].

Fabrication of nanostructured metal oxide films is attracting interest in terms of technological applications [19-22]. They have been studied due to their vast range of use [23], including in applications such as solar cells, UV detectors,

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Analysis of Symbol Error Rate in Amplify And Forward Nakagami-M Cooperative Networks

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Abstract

In this paper, cooperative wireless network over independent non-identical Nakagami-m fading channels is analyzed and evaluated under the consideration of Amplify- and- forward Mode (AF) with M-ary Phase Shift Keying (MPSK) modulation for different cases of the fading parameters m. The performance analysis of average Symbol Error Rate (SER) is considered to behave the network performance since that SER is determined by using Moment Generation Function (MGF) over various values of the Signal to Noise Ratio (SNR). The simulation results of our proposed mathematical model reveals that SER performance downgrades as either the m parameter or the number of relays increases.

Keywords: cooperative networks, amplify-and-forward, symbol error rate, Nakagami-m fading channels.

INTRODUCTION

The Cooperative networks and collaborative strategies protocol relay has been the subject of the research due to its great influence in the field of wireless communications and its applications. Many works state its role in advanced communications and many relaying strategies have been presented, and different relaying protocols could be employed. The received signals at any given relay node could be multiplied by a gain and forwarded, namely employing the amplify- and-forward (AF) relaying protocol. Or they could be decoded and the originally sent messages estimated, before being encoded again and forwarded. This second relaying protocol is known as decode-and-forward (DF). The third option is the compress-and-forward (CF) relaying protocol [1-3]. In these strategies, the users serve as information sources as well as relays. In AF, the relay solely amplifies the received signal from the source, and re-transmits it to the destination without doing any further processing on the source transmission [4],[5]. Therefore, AF relaying incurs low-cost hardware implementation, which represents an ingenious solution to the field of communications systems. For this reason, we investigate the performance of all participate cooperative networks with AF in Nakagami-m fading environments. Nakagami-m fading model has been an important subject of study in cooperative networks, because it provides the most appropriate information and realistic radio links [6-10].

For example, authors in [7] analyzed the performance of cooperative diversity wireless networks using amplify-and-forward relaying over independent, non-identical, Nakagami-

m fading channels and derives the symbol error rate and the outage probability using MGF of the total SNR at the destination.

The authors in [8],[9] analyzed the performance SER of a cooperative communication wireless network with a single relay system over independent and identical Nakagami-m fading channels. The concept of the Alamouti code is transmitted through an amplify-and-forward (AF) relay. The exact SER is determined using the MGF of the total SNR for a particular signal in the case of M-ary phase shift keying M-PSK modulation schemes. In [10] the closed form expressions of the Cumulative Density Function (CDF) and MGF are used to find the Outage Probability. In [11][12] for a given bit error probability of a user, optimal-power-allocation strategy, considering both AF and DF, is proposed to minimize the total energy consumption based on the optimal power allocation between one source and one relay.

In this paper, the performance analysis for all participate AF (AF) cooperative networks in Nakagami-m environment are presented. Also closed-form expressions for the MGF in independent none identically distributed Nakagami-m are derived. Then the obtained MGF is used to derive close-form expression of the outage probability, and SER of different M-PSK signals.

The rest of the paper is structured as follows: Section II describes the system model and the underlying assumption while Section III describes performance and analysis MGF, the outage Probability and SER. Section IV shows the simulation results and analytical results of SER. Section V is drawn the conclusions of this work.

SYSTEM MODEL

We consider the cooperative communications through channels of Nakagami-m fading. The cooperation network system model is composed of a single antenna source, ($1 \leq i \leq R$) single antenna relays and half duplex AF relays as well as a single destination, as shown in Fig. 1.