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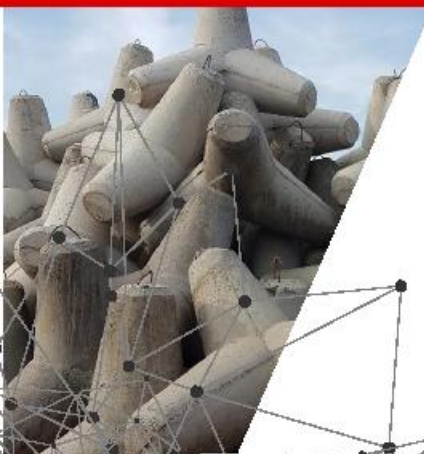
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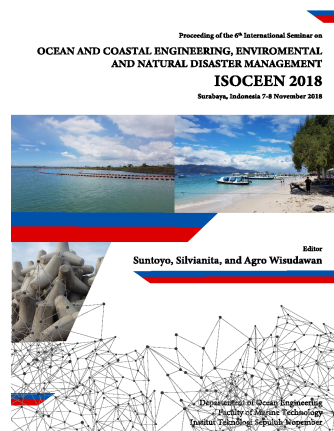
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Foreword: The 6th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management (ISOCEEN) 2018 was held in Surabaya, Indonesia, on 7 - 8 November 2018. The Organizing Committee acknowledged for their dedicated preparation over many years that led to successful seminar with broad participant. A record 102 attendees from 6 countries (Indonesia, Japan, Netherlands, Malaysia, Portugal, Vietnam) gathered at Swiss-Belinn Hotel Manyar Surabaya, Indonesia to discuss research and application in the field of Ocean, Offshore, Coastal engineering, Environmental and Disaster Management. This event is held by cooperation among Institut Teknologi Sepuluh Nopember (ITS) especially Department of Ocean Engineering, Tohoku University, Japan, TU Delft, Netherlands, UNESCO-

IHE Delft, Netherlands and HZ University of Applied Sciences, Netherlands. The 39 selected, peer reviewed papers contained in this Proceedings cover the topics including the field of Ocean, Offshore, **(More)**

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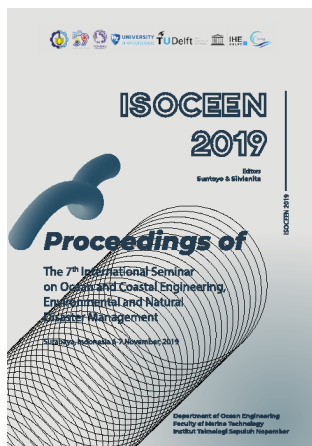
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Technical Analysis of PVC Pipe Materials for Hull Vessel

Wilma Amiruddin and Hartono Yudo

Naval Architecture Department, Diponegoro University, **Indonesia**

Keywords: Strength, Vessel, PVC, Wooden.

Abstract: The use of PVC pipe material as a hull vessel can have a technical and economic influence when compared to a wooden ship. This study aims to determine the difference in the longitudinal strength of the ship from of both. It's based on the maximum stress produced by referring to the BKI Class for Wooden Ship Regulations. To see the technical benefits due to differences in the use of the material, treatment was given by setting the same loading capacity (17 GT) for both ships as the dependent variable and the main principles as the independent variable, PVC ship: $Loa = 18.3$ m, $B = 4, 25$ m, $H = 0.75$ m, $T = 0.5$ m and Wooden Ship: $Loa = 15$ m, $B = 5.2$ m, $H = 1.8$ m, $T = 1$ m. Analysis results is the maximum stress of PVC fishing boats ($\sigma_{Deck} = 9.714$ N/mm²) have a greater than wooden fishing boat ($\sigma_{Deck} = 4.2817$ N/mm²). The difference in strength values can be used as a consideration in deciding the use of PVC material or wood material.

1 INTRODUCTION

Bamboo rafts as early of the history of shipbuilding or ships in modern times are now used for certain conditions in the interior. Along with the development of technology, in this case pipes made of PVC (polyvinyl chloride) plastic have made PVC pipe ships in Taiwan with the same principles as bamboo rafts. The length of the ship ranges from 30-40 feet. The ship is used by fishermen to catch fish, with diesel engine drives. Figure 1 shows examples of the shape of the pipe profile as intended.



Figure 1: PVC Pipe.

Polyvinyl chloride (PVC) is a pipe made of plastic and several other vinyl combinations. It is a third-order thermoplastic polymer in terms of the number of uses in the world, after polyethylene and polypropylene. In around the world, more than 50%

of PVC produced is used as construction material. PVC is relatively inexpensive, durable, and easily assembled. PVC can be made more elastic and flexible by adding plasticizers.

In Indonesia traditional ships are generally made from wood materials, likewise fishing vessels used by most fishermen. The wood used has certain requirements both physically (sufficient strength) and durability (resistant to decay and from wood-destroying animals). In addition, wood is also old and long-sized. The problem that arises from the use of this material is the reduced material stock and increasingly expensive prices. The growing speed of wood needed is relatively slow compared to the consumption of wood material. Logging trees that are still enough to meet these needs can damage the environment.

A fishing vessel made from PVC pipe has been built in a traditional shipyard in Pekalongan. The construction of this ship is also an alternative to new wood replacement materials. The use of this new alternative material requires a research on its feasibility, both technical and economic. The study in this paper will provide an analysis of one of the technical aspects, namely the strength of the length of the ship.

The maximum flexural stress value obtained from the use of PVC material as a hull material will be compared to the strength requirements of wood material commonly used as raw material for wood



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Paper



Tidal and Seasonal Variability Circulation Patterns in the Coral Reef System, Berau Continental Shelf, East Kalimantan

In Proceedings of the 6th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management - ISOCEEN, 9-15, 2018 , Surabaya, Indonesia

Tidal and Seasonal Variability Circulation Patterns in the Coral Reef System, Berau Continental Shelf, East Kalimantan

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Keywords: Tidal Variability, Seasonal, Coral Reef System, East Kalimantan.

Abstract: The present study examines tidal and seasonal circulation dynamics in the coral reefs, Berau Continental Shelf, East Kalimantan which exist multiple reef passages by using analysis field data and a three-dimensional hydrodynamic model. The predicted M2 tidal currents, velocities, salinity profiles and sea surface elevation show a good agreement with observed. The model results demonstrate the reef-scale circulation patterns on tidal to monsoonal variation. On the seasonal timescale, the circulation patterns strongly reflect the Monsoon seasonality. The coral reefs exposed by river plume when southwesterly wind prevailed. In this period, the vertical structure of salinity displays a thin stratified water column. The velocity profiles exhibit a classical estuarine circulation with outflow at the top layer and inflow at the bottom layer. For the tidal periods, the tidal currents present complex structures at the reef passages and exhibit the tidal eddies generated by irregularities reef gaps. The flow in the centre of the reef passage is often opposed to the flow near the reef boundaries. A mixed vertically water column occurs during spring tide. During neap tide, the water column structures form a thin stratified on top layer and a classical estuarine circulation for velocity profiles. At the cross-section of reef passages, the lateral velocities develop the two-cell circulation with upward flow at reef shores and an axial convergence (downward flow) at mid-reef passage during flood and reverse pattern during ebb. At the reef slope of continental shelf edge, the model results suggest an upward flow that generated by a Bernoulli effect during flood tide, which may be lifting the nutrient-rich water to the reef passage.

1 INTRODUCTION

Circulation dynamics in coral reef systems can be driven by a number of forcing functions such as waves, tides, wind and density gradients (Andrews and Pickard, 1990; Kraimes, 1998; Wolanski, et al, 1988; Wolanski and Thomson, 1984; Houtink, 2004; Monismith, et al, 2006). The associated length scales are ranging from an individual coral colony to the reef, island, and basin scale (Monismith, 2007). In coral reef systems, the hydrodynamics play a crucial role in ecological and biogeochemical processes including dispersal of larval fish and corals (Black, 1993), supply of nutrients to reef organisms (Falter, et al, 2004), renewal of oxygen (Nakamori, et al, 1992), delivery of phytoplankton (Yahel, et al, 1998), the dynamics of zooplankton (Yahel, et al, 2005),

transport of terrigenous sediments (Storlazzi, 2004; Haitink and Hockstra, 2003), and the distribution of mobile reef fishes (Clarke, et al, 2005). Therefore, to understand biological and ecological patterns and function in coral reef systems, it is critical to identify the circulation and transport processes.

The importance of wind and waves on circulation patterns in coral reef environments has been investigated extensively (e.g. Wolanski and Thomson, 1984; Houtink and Hockstra, 2003; Wolanski and Pickard, 1985; Yamano, et al, 1998; Presto, et al, 2006; Kench, et al, 2009). Wolanski and Thomson (1984), Wolanski and Pickard (1985) reported that the subtidal sea level dynamics and currents are found to be highly coherent with the local wind variability in the Great Barrier Reef. Trade wind-driven processes are found to be the dominant

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MSI Analysis of a Roro Ferry Design

In Proceedings of the 6th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management - ISOCEEN, 71-76, 2018, Surabaya, Indonesia

MSI Analysis of a Roro Ferry Design

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²School of Marine Science and Technology, Tianjin University, China

Keywords: Comfort Level, MSI Analysis, Relative Motion Spectrum, Roro Ferry, Vertical Acceleration.

Abstract: Crew and passengers' comfort is one of the main objectives in the design of a ferry. A parameter quantifying it is the so-called motion sickness incidence (MSI). In this study, the comfort level of a roro ferry design is assessed for which the vessel's vertical acceleration and the MSI were used as quantitative parameters. The voyage area is the seas around Adau, Saumlaki and Letuwang in the Eastern part of Indonesia. The response characteristics of the vessel were calculated using a diffraction theory. The vertical acceleration and the MSI were determined from the vessel's relative motion. The predicted vertical acceleration is 1.18 m/s² or equal to 0.12 g, where g is the gravitational acceleration. Although the vertical acceleration is 20% below the maximum recommended one of 0.15 g, the discomfort level is, according to ISO 2631-1: 1997, classified as uncomfortable. Furthermore, the predicted MSI is approximately 15%, which is larger than the maximum recommended one of 10%. Further consideration of the design and/or operating location is recommended.

1 INTRODUCTION

Crew and passengers' comfort is one of the main objectives in the design of ferries. A parameter quantifying it is the so-called motion sickness incidence (MSI), which concept was first proposed by O'Hanlon and McCauley (1974) in the early 1970s. A definition of the MSI is as follows: the percentage of passengers who vomit within an exposure time of two hours. Improvement of comfort level and the consequence reduction of MSI have always been considered as the most important factors in the design of passenger ships (Campana et al., 2009; Diaz and Peri, 2010).

Piscopo and Scamardella (2015) gives an overview of the historical development of the concept of MSI and the similar concept, called vomiting incidence (VI), developed by Lawther and Griffin (1987). The development started from a consideration of a simple vertical sinusoidal motion (O'Hanlon and McCauley, 1974) to irregular waves making an arbitrary angle to a moving vehicle, including population characteristics (age, gender). It turns out that the vessel's vertical acceleration dominantly determines the motion sickness incidence (O'Hanlon and McCauley, 1974; Lawther and Griffin, 1987;

ISO, 1997; Lloyd, 1998; Cepowski, 2012; Piscopo and Scamardella, 2015).

The purpose of this study is to analyse a given ferry design regarding its comfort level by estimating the vessel's vertical acceleration and the value of the MSI, which are then compared with recommended standard values. The analysis results can serve as feedback to further consider the design and/or the operating location of the ferry.

Furthermore, case studies of full-scale design in which detail calculations of vertical acceleration and MSI are discussed, are still lacking. The present results can enrich the literature on MSI.

2 SHIP PARTICULARS AND WAVE DATA

The ship particulars are summarized in Table 1. The lines plan and general arrangement are shown in Figs. 1 and 2, respectively (Safina, 2017; Setyawan, 2018).

The intended operating location of the ferry is the seas around Adau, Saumlaki and Letuwang in the Eastern part of Indonesia (see Figs. 3 and 4). The representative significant wave height is 2.28 m and the average zero up-crossing wave period is 5.95 s

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