ISOCEEN 2020

Abstract Proceeding of

The 8th International Seminar on Ocean and Coastal Engineering, Environmental, and Natural Disaster Management

PREFACE

The 8th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management (ISOCEEN) 2020 was held in Surabaya, Indonesia, on 27 – 28th October 2020, with the theme taken is "**Integrated Approach for Sustainable Science and Technology on Offshore, Ocean and Coastal Engineering**". The Organizing Committee acknowledged for their dedicated preparation over many years that led to successful seminar with broad participant. 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 papers contained in This Proceedings cover the topics including the field of Ocean, Offshore, Coastal engineering, Environmental and Disaster Management. This forum is more focused on creating and expanding professional network to foster the relationship between the University, industry, business and communities across the country.

Finally, on behalf of the organizing committee of the seminar, sincere appreciation is expressed to all authors contributing to our seminar. Special thanks are also due to all keynote speakers, invited talks and chairpersons for the efforts in preparing the manuscripts and managing the sessions, respectively.

Sincerely yours
Chairman of the Organizing Committee ISOCEEN 2020
Department of Ocean Engineering, Faculty of Marine Technology
Institut Teknologi Sepuluh Nopember

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- Assoc. Prof. Ir. Dr.Eng. Ahmad Fitriadhy (University Malaysia Terengganu, Malaysia)
- Assoc. Prof. Ts. Dr. Mohd Faris Khamidi (College of Engineering, Qatar University, Qatar)

CONTENTS

Measurement of Hydrodynamic Parameters and Seawater Quality along the Coast of Oman

Assoc. Prof. Ahmad Sana, Ph.D [1] (Keynote Speaker)

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Abstract. Infrastructure and real estate development along the coasts of the Arabian Peninsula have been among the most significant construction activities globally. Historically the coastal communities in the countries located in this region depended on marine resources and sea trade before oil was found. Now, most of the Gulf Cooperation Council (GCC) countries, including Oman, are striving to diversify their investments in sectors other than crude oil-related industries. On one hand, coastal real estate development is on the rise and on the other fisheries resources are being considered for food security and employment. All the local anthropogenic activities are bound to affect the coastal water quality adversely, in addition to global climate change. There are two major challenges by virtue of engineering design; technical sustainability of coastal structures and environmental footprint of the coastal development. In the present baseline study it is endeavored to address both these challenges by carrying out in situ measurements of hydrodynamic parameters and seawater quality using state of the art equipment. The waves and 3D currents were measured using AWAC (Nortek) profilers at eight locations along the coast of Oman. At twelve locations physicochemical parameters, heavy metals, organic carbon, and hydrocarbons were examined in seawater samples. The wave measurement showed that significant wave height and peak wave period ranged between 0.01 to 3.31 m and 1.04 to 19.9 s, respectively during the study. Also, the averaged current intensity at the upper surface was 0.3 m/s with the dominant direction towards South at Muscat coastal station; 0.15 m/s with the dominant direction towards Southwest at Al Batinah coast; and 0.2 m/s with the dominant direction towards Southeast at the Southern Oman coastal station. The mixed semidiurnal tidal cycle with a tidal range of about 2 m during spring tide event and 1 m during neap tide was observed in the study area. The elevated lead in the seawater in most of the stations and in the sediment at Duqm suggests the anthropogenic inputs of oil spills from the repair and frequent movement of the fishing boats and the shipping vessels along with the industrial and local discharge at the contaminated sites. However, the detected highest level of heavy metals and hydrocarbon in Omani coastal water and sediments were much less than the chronic level reported at the polluted location of the World. The study proposed to establish permanent coastal monitoring stations along the coast of Oman.

The ERA5 Reanalysis, a new seamless ECMWF* Wave and Atmospheric Climate Dataset

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Abstract. The ERA5 is the newest European Centre for Medium-Range Weather Forecasts (ECMWF) reanalysis, embodying a detailed record of the global atmosphere, land surface and ocean waves data, from 1950 onwards. This new reanalysis is intended to replace its predecessor, the the ERA-Interim reanalysis (spanning 1979 onwards) which was started in 2006. ERA5 is produced with the Integrated Forecasting System (IFS) Cy41r2 coupled model system, which was operational in 2016 at the ECMWF. For that matter, ERA5 benefits and incorporates a decade of developments in model physics, core dynamics and data assimilation. This paper, and related talk, describes the ERA5 reanalysis, with a specific emphasis on the wave data component, namely its performance skills, compared to other similar products, such has the CFSR and JRA-55 wave hindcasts. The ERA-5 wave data is also compared to an extensive independent situ wave observations data set across the global ocean. The comparison with independent in situ data showed a considerable improved fit for ocean wave height. The ERA5 is also compared against a high resolution global wave hindcast, produced at the ECMWF using ERA5 interpolated winds and a modified version of the ECWAM wave model.

(*) European Centre for Medium-Range Weather Forecasts.
(**) With the contribution from Gil Lemos and Jean Bidlot.

Glocalising National Resilience Agenda via Transdisciplinary Approach: Global Knowledge for Local Action

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Abstract. The wellbeing of our communities depends on a complex web of institutions, infrastructure and information. This wellbeing however is under constant threat from external or internal stresses and shocks such as food-water-energy security, biological related such as pandemics (e.g. Covid-19), economic disturbance (GCC Blockade on Qatar), rapid urbanization, political conflict, natural and man-made hazards, terrorism, among others. Some of these events are foreseeable, however unforeseeable events (often referred to as 'black swan events) also occur with surprising frequency. These events reinforce the need for our cities and nation to be resilient to such known and unknown shocks and stresses to avoid decay and collapse. Nations today are highly complex due to the nature of the connectivity and interdependency between systems and the way these systems respond to stress / shocks. The way this interconnectivity is understood and managed, will result in varying levels of resilience between cities and nations. The world today is Volatile, Uncertain, Complex and Ambiguous or in short VUCA. Hence, there is a critical need to explore how transdisciplinary approach can integrate National Resilience framework of a country. The interplay between the global and the local creates a third entity where assets of both global and local systems can be taken into account to compensate the weaknesses of patronizing globalization and short-sighted localization. This further emphasis the need for all stakeholders of various disciplines to collaborate and integrate in order to achieve wisdom in ensuring national resilience.

Performance Comparison of Four Turbulence Models in the Turbulent Boundary Layer beneath Cnoidal Waves Motion

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Abstract. Turbulent structures in the bottom boundary layer beneath the wave motion have an important role in the nearshore sediment transport modeling and its analyses. Cnoidal waves can be used as a representative of asymmetry waves in the ocean. Selection of the proper turbulence model is one of the most important problems for this type of the numerical modeling. In this paper, is aimed to observe the structure of turbulent boundary layer under cnoidal waves as a representative of asymmetry waves in which the effect of asymmetric is actualized along wave cycle related with the wave asymmetric parameter, Ni. The turbulent boundary layer characteristics beneath cnoidal waves motion (i.e. mean velocity and turbulent intensity) are given in the results of experimental results and turbulent numerical models (i.e. the k-ε, the k-ω, the BSL k-ω and the SST k-ω model). Turbulent properties prediction of cnoidal waves from each turbulence model is compared among them and that of experimental results. A laser Doppler velocimeter (LDV) is used to measure the profiles of velocity distribution in the tunnel of oscillating wind over rough bed beneath cnoidal waves motion. From the comparison of the average velocity distribution between all the models of turbulence and the results of experimental for the cases of cnoidal waves in general, it was obtained that the model of BSL k-ω is superior to predict which is followed by the model of k-ε, the model of k-ω and the model of SST k -ω.

Optimisation on Hydrodynamic Performance of Twin Pontoon Floating Breakwater

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Abstract. The lateral separation (S/D, net draft (d/h) and porosity (n) ratios of twin pontoon floating breakwater (TPFB) are the prominent factors to attenuate wave energy transmission which results in proportional reduction of sediment transport. In fact, a numerical investigation into obtaining an optimum ratio of each S/D, d/h and porosity TPFB is inevitably required. To accommodate such demand, a numerical optimisation model of Genetic Algorithm (GA) is presented to asses the optimum S/D, d/h and porosity through primarily minimising wave transmission (K_t) and reflection coefficient (K_r) while maximising energy dissipation coefficient (K_d). Several parameters such as wavelenghts as well S/D, d/h and porosity ratios including a set of optimisation criteria, have been taken into account in the simulation, where the optimum solution is then selected from various populations. In addition to the current GA simulation, the optimum result will be evaluated by the value of K_t, K_r and K_d coefficients. Meanwhile, it is then qualified by means of some amount of the reduction rate on sediment transport, in which it is visualised via Computational Fluid Dynamic approach. The results revealed that the GA simulation is effectively capable of determining global trade-offs between K_t, K_r and K_d. As compared to the existing model, K_t and K_r decreased to less than 0.3 and 0.4 respectively, whereas K_d increased up to 0.9 resulting to optimum hydrodynamics of TPFB indicated by further reduction in the gradient of bed load and suspended sediment concentration (5%-400%). Hence, a robust design concept of the present optimisation algorithm can serve as a useful coastal engineering tool to find the optimal floating breakwater.

Hydrodynamics Performance Analysis of Vertical Axis Water Turbine (VAWT) Gorlov Type Using Computational Fluid Dynamics (CFD) Approach

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Abstract. The Renewable Energy conversion technology has been increasingly developed along with the awareness regarding the negative environmental issues caused by Non-renewable Energy waste. Vertical Axis Water Turbine (VAWT) is an interesting research object because of variety of advantages it offers. The Gorlov type VAWT is famous for its tendency to move regardless the water flow directions and able to rotate twice as fast as the inlet velocity. Things which need to consider important related to the turbine hydrodynamic effects including the quantity of blades, hydrofoil profiles, pitch angle, and turbine's dimension ratio. In this study, numerous variations were applied to determine the hydrodynamic effects caused especially torque output. Investigations were carried out using Computational Fluid Dynamics (CFD) simulations. The Gorlov type turbine model is simulated in 3D under steady state flow conditions. The software used to run numerical simulations is ANSYS V18.1. The flow model used is laminar according to secondary data analysis. After the numerical simulation results are obtained, validation is performed with an average error rate of less than 10%. Variations chosen in this study is the pitch angle of 40° and 30 °, the dimension ratio in the form of 450 mm in diameter, the type of asymmetrical hydrofoil (S1210), and the quantity of blades (2, 3, 4, 5, and 6). Simulation results in the form of torque values showed that the best turbine performance is provided by NACA 0012 symmetrical hydrofoil with 40° pitch angle.

Developing Small Dual-Fuel Diesel Engine to Control Marine Pollution by Reducing NOx Emission for Application in Fishing Vessels

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Abstract. Using natural gas for fueling a ship growing extensively since environmental issues become one of the priorities in the shipping industry. The ship uses natural gas as the main fuel commonly called as a gas-powered ship. Gas has lower specific prices compare with any type of diesel fuel. But due to handling, storage, and distribution costs then gas prices for ships become higher even still a bit cheaper than diesel fuels. Besides prices, technically gas is cleaner so it may give the lower emission levels. Dual fuel technology is the best choice in occupied gas as ship fuel due to the existence of the IGF Code. Established Dual-fuel diesel engine is very expensive and available for big power capacity. This research develops a small dual-fuel diesel engine from a conventional engine with power less than 10 HP. The piston crown is a part of the engine that was modified so that the engine can use natural gas in the best performances as the conventional one. NOx as the most hazard emission in the diesel combustion process is controlled to be as the lowest as possible. The quality of air may be significantly affected by those small engine pollutions because of the large number of vessels in that dense environment in the typical fishery villages. In conclusion, the modified dual-fuel diesel engine capable of reducing NOx emission by up to 31% at a practical safe operation of 50% dual-fuel. The higher gas portion gives a lower NOx emission level.

The Estimation of Hourly Solar Radiation on Tilted Surface Using Artificial Neural Network: A Study Case of Surabaya

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Abstract. This study aims to generate an accurate model for estimating the radiation of solar panels on different inclination angles. The output of this model is useful for determining the optimal installation angle of the solar panel either on land or on the ships. Furthermore, the amount of the hourly direct and diffuse radiation on the horizontal surface is estimated using Artificial Neural Networks (ANN), which were trained with the monthly radiation data of Surabaya from 2018 to 2019. Subsequently, the radiation on the inclined surface is estimated using a mathematical model. Also, the ANN accuracy was validated with a regression value higher than 99% for either direct or diffuse radiation estimate. A full-year evaluation based on the proposed model suggests an inclination angle of 25° for the solar panel installed in Surabaya. Meanwhile, the evaluation gives different angles for each month with the advantage compared with the fixed angle installation.

Design of Rubble Mound Slope Protection for Cellular Cofferdam Breakwater Retrofitting

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Abstract. A rubble mound slope structure was designed to protect a decaying cellular steel sheet pile cofferdam breakwater which has been partially damaged. Reparation of this decaying cofferdam breakwater to its original form is considered uneconomic. Considering three basic design requirement, i.e. economic feasibility, environmental sustainability, and structural reliability and constructability, the rubble mound slope design has been proposed as a retrofit structure against 4.7m height of a 100yrs return period design wave. In this design, the existing vertical cofferdam stands originally at the harbour side, whereas the new additional rubble mound structure is attached to the cofferdam at the sea side creating together a new horizontal composite breakwater. The existing cofferdam supports the rubble mound structure at the harbour side, whereas the rubble mound structure provides protection against direct wave attack. This retrofit design of structure requires less 25% of materials volume and costs 30% cheaper than a full standalone rubble mound breakwater type. This less requirement of materials will consequently have positive impact on environment and natural resource conservation. The design of rubble mound slope that is directly attached to the existing breakwater will enable its easy construction by using vehicles that stand on the top of the existing breakwater. This article describes the design consideration including discussion on the structural reliability of the retrofitted breakwater.

The Design of An Arduino Based Low-Cost Ultrasonic Tide Gauge with Internet of Things (IoT) System

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Abstract. Ocean tides play essential roles in the field of hydrography and navigation. The conventional method to measure tides is by observing the vertical variation of sea surface using a tide staff. However, this method has several disadvantages. It consumes more human resources and time to observe and record the take. Moreover, the recorded data tends to be subjective, depending on the observer. To overcome these disadvantages is by using an automatic tide gauge. This instrument can also provide almost continuous and near real-time tide data. The price of automatic tide gauge in the Indonesia market is costly. This research attempted to build a low-cost ultrasonic tide gauge by utilizing an Arduino microcontroller, ultrasonic sensor, GPS module, which is embedded with the Internet of Things (IoT) so that the real-time data can be uploaded and monitored on a webserver. The quality of the data collected from the instrument is controlled using the 3σ rule to detect and remove outliers. Moving Average and Moving Median filtering methods are applied in the system to eliminate the noise. The data accuracy-test was performed using a relative error and Root Mean Square Error (RMSE) methods. The test compares the data collected with the ultrasonic tide gauge and the direct observation method. The result shows the relative error, and RMSE values 0.226% and 6.629mm for raw data, 0.636% and 18.542mm for moving average data, 0.437% and 13.242mm for the moving median data, with the best filtering method is moving median. The instrument accuracy test results show that this instrument has excellent accuracy, with a 2,240,000 IDR instrument production budget or 7.5% of the lowest tide gauge prices.

Coastal Erosion Management by Implementing Concept of *Building with Nature (BwN)* in Demak Regency, Central Java, Indonesia

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Abstract. Coastal erosion that occurring in the north coast of Java, led to significant coastline erosion. One of the areas that run into the coastline erosion is Demak Regency. To overcome the problem, the concept of Building with Nature (BwN) is proposed. This concept uses the media from nature to reduce the wave energy and being sediment trap. BwN has applied in Demak Regency, exactly in Sayung village since 2013. According to the evaluation, the BwN was able to capture sediment of 0.4 cm/year. The amount of sediment is expected to be increased by adding the number of BwN and change the pattern of BwN. To determine the amount of increased sediment, a model using the DELFT3D software is utilized. The data used in the model is based on field measurement data in 2016. BwN in the model is defined as thin dam. The results show that the average amount of sediment around BwN after adding two BwN in front of the existing BwN increase to 0,6 cm/year. This number increases to 25% than previous observation. This solution is expected to help the faster shoreline restoration in Demak coast.

Water Quality Modeling Distribution at Bali Strait in The Western Monsoon and Its Impact for Ecosystems

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Abstract. The Bali Strait is geographically located between Java and Bali Island, with a total area approximately 900 square miles. It has a high potential of fish produces an average of 100 tons/year. The types of fishes there are tongkol, layang, and lemuru with high economic values. Bali Strait affected by the oceanographic phenomenon of upwelling in the Indian Ocean and has shallow and narrow bathymetry conditions made high currents speeds. The abundance of nutrients in Bali Straits made the ocean water fertile and rich in fish give an advantage for anglers. The nutrient is present in Bali Strait caused by water flow from land. These conditions is become triggers for an explosion of phytoplankton populations or called booming algae. The shrimp waste from companies disposing of the waste to Bali Strait consists of parameter DO, BOD, COD, TSS, Phosphate, and Nitrate. Research on the distribution of water quality in Bali Strait in the Western Monsoon has to research, where previous researchers have researched in the Eastern Monsoon. The purpose of this research is to find out the distribution of water quality parameters in the Bali Strait using MIKE 21 Ecolab. The result of this research shown the maximum distribution exceed water quality parameter and influence for the biota are BOD = 83.031 mg/L, Nitrate = 0.924 mg/L, Phosphate = 0.176 mg/L and TSS = 27.574 mg/L. The BOD makes the water polluted, Nitrate and Phosphate is the trigger for booming algae, and TSS is not suitable for coral and seagrass.

An Experimental Study on Hydraulic Model of Water Intake Canal at Steam and Gas Power Plants

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Abstract. The performance of the canal water intake used in the Gas and Steam Power Plant (PLTGU) cooling system is carried out by testing the physical model of the water intake canal with a 1:15 scale model. In which, the canal water intake prototype has dimensions of length, L = 33.30 m, width, B = 13.40 m and height, T = 11.67 m, scaling the prototype dimensions to the model dimensions is done by complying with Froude's law. The purpose of this paper is to determine the flow patterns that occur in the physical model and the minimum elevation allowed based on applicable guidelines [1]. The variables measured in this study were the flow velocity in the canal and also the visual documentation of the flow pattern in the canal including the formation of vortices. Tests were carried out on three variations of tidal elevation, namely HWL, MSL and LWL. The experimental results show that the flow pattern in the channel varies with depth with an average Reynolds Number value = 3.5 x 104. Vortex formation occurs at all elevations where the vortex is formed in the area near the pump. The observations show that the critical elevation of the canal is at H = 0.29 m for the model and H = 4.35 m for the prototype.

Identification of Jetty Ruins on The Seabed Using Sub-Bottom Profiler and Side Scan Sonar (Study Case: Special Port of PT. Holcim, Tuban)

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Abstract. In January 2019, the jetty at the PT Holcim Special Port collapsed along 200 m, which was caused by a barge that crashed into the dock. The jetty ruins that laid at the seabed then dredged for the purpose of rebuilding a new jetty at the same location as the old jetty that collapsed. But apparently there are still remnants of the jetty ruins at the seabed which disturb the ongoing construction of the new jetty. Therefore it is necessary to check the bottom of the waters to determine the position and the thickness of the jetty ruins which is still laid on the seabed. In this study the measurement of the dimensions of the jetty ruins was carried out by a hydrographic survey using a side-scan sonar and a seismic survey using a sub-bottom profiler. Sub-bottom profiler data is used to measure the thickness of the jetty ruins, while the side scan sonar data is used to analyse the distribution pattern and the total area of the jetty ruins. The results of processing and analysis obtained a model of the distribution of jetty ruins with a total collapse area of 1,668 m². There were 49 jetty ruins on the seabed with an average thickness of 0.8 m. In addition, there were also 14 ruins of the jetty beneath the seabed, with an average thickness of 1.25 m. Data generated from SBP and SSS both show that the majority of the jetty ruins are found in the center and the west side of the pier.

Identification of Free Span on Underwater Pipeline Using Side Scan Sonar and Dual-Head Scanning Profiler

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Abstract. Indonesia is a country that has an important role in the oil and gas industry. Considering this important role, it is necessary to conduct an inspection and safety inspection to support the sustainability of the oil and gas industry in Indonesia.. In this study the method used is the processing of side scan sonar (SSS) and dual-head scanning profiler (DHSP) data obtained from PT. Pageo Utama. Side scan sonar data is used as a visual representation of the pipeline while dual-head scanning profiler data is used to obtain the topography of the sea and surrounding pipes to identify the dimensions of the free span. The result of this study shows 47 free spans from a 6.8 km underwater pipeline. Free span with the longest dimension is FS-43, with length of 42.109 m and height of 0.44 m, which is located at KP 6.045. Free Span with the highest dimension is FS-45, with height of 1.22 m and length of 20.329 m, which is located at KP 6.465.

Hydrodynamic and Sediment Transport Simulation at The Port of The Electric Steam Power Plant Adipala and Serayu Estuary, Central Java Province, Indonesia

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Abstract. The coastal area of Cilacap Regency in Indonesia has an important role in increasing activity, economy and ecosystem. The research location is in the southern coastal area of Java and directly faces the Indian Ocean. This can lead to dynamic marine phenomena and cause various kinds of sedimentation problems. To analyze the phenomena that occur in Cilacap seawater, a numerical model is applied to obtain optimal results. MIKE21 software with Hydrodynamic and Sand Transport modules were used in this study to analyze the flow patterns and sediment transport that occurred. The model was built with Cilacap waters as the boundary and was made within 30 days. The result obtained is the model validation using the RMSE method shows a value of 16.33% so that the model is included in the good category. The average direction of the current pattern from the results of the model leads to the west and northwest. The current velocity at low tide is greater than at tide. The most significant bed level changes occurred at the mouth of the Serayu River and the east side of the breakwater.

Modeling of Sediment Distribution and Changes of Morphology in Estuary Flow Kapuas River, West Kalimantan

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Abstract. Pontianak Dwikora Port is a port that has been owned by Pontianak City since the Dutch colonial era and has been used as a trade center to export and import goods needed by West Kalimantan Province. Dwikora Port is located inside the Kapuas Kecil River and under the auspices of PT Pelabuhan Indonesia II (PELINDO II). Due to the location of the port in the river, the shipping channel is often disrupted due to silting (sedimentation) at the river mouth. So that the ships do not run aground, periodic dredging is carried out. This is to find out how much sediment is in the estuary. So, this study continues previous research by performing mathematical modeling using Mike 21 software to determine the sediment distribution flow patterns that affect silting that occurs in the Kapuas Kecil River Estuary. The data to be used are tidal data from field measurements, wind data from BMKG, wave generation data, river discharge, and TSS from previous research journals. The TSS used is derived from the river with the maximum taken from previous studies, namely 0.63 gr / L. The result is that the flow pattern of sediment distribution is strongly influenced by the confluence of flow patterns from rivers and sea. Sediment originating from the river slows down at the estuary as a result of the width of the river and is held back by waves from the sea, coupled with the tidal effect that occurs, the sediment oscillates and settles on the bottom of the mouth of the Kapuas Kecil River, causing changes in the basic morphology of the estuary.

The Study of Coastline Changing and Total Suspended Solid Distribution Based on The Remote Sensing Data in Teluk Lamong Multipurpose Port Terminal

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Abstract. With regard to socio-economic development, many construction projects have been carried out in Indonesia to meet the practicing requirements of urban, agricultural, and industrial. Those projects are including the urban development, the metro construction, the groundwater pumping, and the coastal reclamation. Moreover, the activity which has significant implication to the environment is any activity related to port operations. Looking forward to the abovementioned conditions, this research is needed to elaborate on the effects of the reclamation to the marine resources in Teluk Lamong Multipurpose Port Terminal as the reclaimed product. In order to describe the impact of the port development, this study will analyze the shoreline changing, the current pattern modeling, as well as the Total Suspended Solid (TSS) modeling using the remote sensing data. The several numbers of expected objectives through this study are to get the set of scientific information on the shoreline changing in Teluk Lamong Multipurpose Port Terminal in the year of 2012 and 2020, to get the figure of current pattern in Teluk Lamong Multipurpose Port Terminal in the year of 2012 and 2020, and to elaborate TSS concentration through the modeling approach in Teluk Lamong Multipurpose Port Terminal in the year of 2012 and 2020. Hence, there is a set of methodologies and tools to cooperate with the information before and after the reclamation. The use of the Digital Shoreline Analysis System (DSAS) software to analyze coastline conditions. The using of Mike 21 to analyze the current pattern and TSS concentrations. In addition to the TSS analysis, it will also need a set of remote sensing data from the Google Earth Engine (GEE). The modeling and calculation give information about the End Point Rate (EPR) values and TSS values. The EPR values are 107.5 m/year, 59,625 m/year and 10,375 m / year. The TSS values are 0-20 mg/L (very low), 20.1-40 mg/L (low), 40.1-80 mg/L (moderate), 80.1-120 mg/L (high) and >120.1 mg/L (very high). Moreover, the result shows the different values among the length of coastline, the current pattern, and TTS in the years 2012 and 2020. The difference in the coastline reaches 950 m at this latest 8 years. While it also brings the changing to the current pattern and sediment transport which show through its current velocity and sediment content per liter of seawater during high and low tide accordingly.

Anak Krakatau Landslide Tsunami Relapse Potential Hazard

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Abstract. Mount Anak Krakatau has a potential hazard that will emerge within 50 years from present time when the peak cone reaches a height that critical to landslides. The Tsunami wave runup as high as 80 meters sweep the steep coast Sebesi and Rakata islands is measured inside the Krakatau volcano complex, during the eruption event and followed by flank collapse on December 22, 2018. The finite volume numerical method of the 3-D Hydrodynamic Model is used to evaluate the potential hazards of Anak Krakatau. Landslide materials with different densities and volumes will be simulated and evaluate which density produce the best estimate of the potential for Tsunami Run-Up waves within the Krakatau complex and Tsunami waves that will sweep and damage the coastal areas of the Sunda Strait. More importanly, the simulation results will provide the tsunami-induced surface current signature information that can be observed by broad range measurement devices.

Evaluation of Saddang Irrigation Main Canal Sediment Trap

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Abstract. Irrigation canals require sediment traps to reduce sediment deposits in the main irrigation canals. The capacity of the Saddang River Irrigation Canal will be increased by 30% to accommodate long-term irrigation discharge needs. To optimize the ability of the sediment trap, an evaluation was carried out using the 2-D finite-volume numerical method for hydrodynamic and sediment transport models. It solves the 2-D dynamic wave equations (the standard depth-averaged St. Venant equations) that are mainly used for river simulation. In addition, the diffusive wave solver is used for watershed runoff simulation and river simulation. The SRH-2D model uses a flexible mesh that may contain arbitrarily quadrilateral and triangular cells. A hybrid mesh may achieve the best compromise between solution accuracy and computing demand. The SRH-2D adopts very robust and stable numerical schemes with a seamless wetting-drying algorithm. The SRH-2D Model solved variables include water surface elevation, water depth, depth averaged velocity plus Froude number, and bed shear stress. Sediment Transport Model solved variables include sediment concentration, erosion and deposition, bed elevation, sediment transport rates, bed material D50 size, and bed material gradations. The results of the optimization of the model are useful for improving the lining channel, flushing time period and the performance of the sediment trap.

Methane Emissions Evaluation on Natural Gas/Diesel Dual- Fuel Engine During Scavenging Overlap

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Abstract. Natural gas/diesel dual-fuel engine is known as a solution for shipping industries to simultaneous reduces NOx and PM emissions nowadays. Unfortunately, high HC emissions are produced, especially at low loads conditions. However, there are two possibilities for the source of HC emissions from the engine, namely during the combustion process and during the scavenging process. This study evaluates the methane emissions (part of HC emissions) concentration during the scavenging process. Cold flow engine simulations are evaluated and validated to this study at low load condition using natural gas injection at intake port during valve overlap. Moreover, several natural gas injection timings are conducted to observe the effect on the methane emissions concentrations at exhaust port after the exhaust valve closed. The natural gas penetration is nearly after the intake valve closed (IVC) thus the natural gas enters the combustion chamber at the next intake cycle. It observed that the scavenging process contributes to the methane emissions formation on natural gas/diesel dual-fuel engine using intake port natural gas penetration after IVC. Besides, the concentration of methane emissions during the scavenging process has very low contribution than the combustion process. It is possibly a variation of the methane emissions concentration in the other valve lift profile and natural gas injection strategies. Thus, it recommends to widely observing how significant the methane emissions generated during the scavenging process on the other engines with those variations.

Study of The Effect on The Addition of Anti-Slamming Bulbous Bow to Total Resistance in Tugging Supply Vessel Using CFD

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Abstract. Anti-Slamming Bulbous Bow (ASB) is a bulbous bow that has been modified according to the Anti-Slamming principle. For waters that have varying wave heights, for example, in the East Nusa Tenggara region where waters meet the criteria for the application of anti-slamming technology and are related to the existence of several offshore buildings and the use of tugging supply vessels (AHTS) for the benefit of the region. This research was conducted to determine the effect of installing anti-slamming bulbous bow and Anti-slamming height on the total resistance of the ship using numerical methods with the help of CFD software. The method used is to vary the height of anti-slamming and the type of bulbous bow on the bow of the ship. Ship modeling is carried out with CAD Software, and while the obstacle analysis uses CFD Tdyn software. Based on the analysis that has been done, the effect of the anti-slamming bulbous bow on the total resistance value of the ship without an anti-slamming bulbous bow is reduced by 3.75%. The ship model, with the use of the anti-slamming bulbous bow, which has the smallest total resistance, is the ship with the form of anti-slimming bulbous bow type Delta (Δ - Type).

Effect of Permeable Structure on Coastal Sediment Transport in Demak Regency, Central Java, Indonesia Model by Using Delft3D Software

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Abstract. Coastal area in Indonesia are places that has a variety of function both economic, culture and social. As time goes by, coastal areas sometimes damaged because of human activities. Declining coastline that caused by erosion is one kind of problems that might be occurs in this area.

Coastal area in Timbulsloko is the example of coastal area in Indonesia that's experiencing declining coastline. One of the attempts to resolve this problem is by constructing permeable structure based on Building with Nature concept. One of the methods to find out whether it's effective or not is by using software modelling to model sedimentation process in this area. By using Delft3D software, there are three model scenario used to model the sedimentation process. the first scenario was made to model sediment transport in the area itself. The second and third scenario were made to model sediment transport in the area with addition of existing permeable structure design. From the results of the models, the first scenario result shows the area is generally eroded. Furthermore, the placement of permeable structure that is simulated in the second and third model was resulting the increasing sedimentation process around the structure. The sedimentaion process around the structures in the third scenario occurs with sedimentation rate around 0.15 – 0.7 m/year. So, the model shows that the permeable structure itself can be used to protect the coastal area from eroding dan helps the recovery of coastal area

Temperature and Salinity Distribution at Pasir Putih Waters Situbondo

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Abstract. Pasir Putih coastal is potential area for coral reefs conservation. Coral reefs playing important role in coastal ecosystem. Temperature and salinity contribute to the growth of the coral reefs. The aim of this study is indentifying the temperature and salinity distribution at Pasir Putih Waters. The research will conduct in September 2020. Temperature and salinity data will collected from six points sampling location. The measurement of temperature and salinity using digital termometer and refractometer. Temperature and salinity distribution will be illustrated with Arc-GIS software.

Tsunami Wave Transformation in Selesung Bay (Lampung)

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Abstract. The 2018 Sunda Strait tsunami is categorized as a volcano tsunami that happens due to Mount Anak Krakatau's flank collapse. The modeling effort with this kind of tsunami is challenging. Selesung bay is located in Legundi Island, one of the suffered islands in the Krakatoa water area. This research tries to do a local scale simulation of the bay's tsunami waves using shallow water wave simulation software. The model permits the simulation of waves transformation in the bay from the offshore side to the coastal point. The result presents that the inundation height of the tsunami in Selesung bay is a combination of wave height (1.5 m), water depth (1.65 m), and wave set-up (0.2 m). Those properties are summing up 3.35 m modeled inundation height, which is committing to less than 1% error from the measured data of 3.38 m. The model also gives an insight into the diffracted wave condition in Selesung bay with a wave height of 2.8 m and a wave period of up to 25 s. All in all, the model shows a good agreement with measured data and permits the benchmarking points for further study.

Mathematical Analysis and Experimental Testing of Floating Building Platform Prototypes Made from Expanded Polystyrene System (Styrofoam) and Lightweight Concrete

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Abstract. Floating building is one of the solutions to anticipate residential areas against Tidal floods which have been occurring on the North Coast of Central Java. This floating building can adjust its buoyancy to the effect of rising sea level and land subsidence. This building can be applied in sea tidal flood areas and retention ponds in polder systems. The main materials used as the floating building platform are styrofoam and lightweight concrete. This study aims to determine the stability, capacity and buoyancy of the prototype platform using styrofoam and lightweight concrete. This study uses mathematical analysis methods and prototype testing with laboratory experiments. Based on the analysis result for the styrofoam material platform with dimensions of 2 x 2 x 0.62 m, a buoyancy force of 2.73 tons was obtained with the Safety Factor (SF) of 1.25. A lightweight concrete weight of 0.97 tons, the load that can be supported by the prototype is 1.2 tons. The prototype of the styrofoam material platform with a lightweight concrete cover has a stable condition with a value of m>0, namely the center of object weight (B0) is +0.74 meters and the metacentric value is +0.9 meters.

Prediction of Streamflow at The Pemali Catchment Area Using Shetran Model

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Abstract. Central Java is one of the provinces in Indonesia which has the most flood events, with a total of 1330 flood events in the span of 1819 to 2020. One of the watersheds in Central Java is the Pemali Watershed, most of which are in Brebes Regency. According to the National Disaster Management Agency (BNPB), there were 57 floods in Brebes Regency in 1994 - 2019. Therefore, to predict the occurrence of a flood disaster, it is necessary to know how much changes in river flow rates in the Pemali watershed. The purpose of this study was to determine the flood discharge at the Pemali river. The streamflow used is the maximum daily streamflow in a year from 2001 to 2017. The method used is the SHETRAN hydrological model. The data used in the SHETRAN model are the data derived from satellite measurements, namely digital elevation model data, MODIS land use land cover, soil type from the Harmonization World Soil Database, rainfall from the Tropical Rainfall Measuring Missions, and evaporation data. The results of this study indicate that river flow rates can be predicted by modeling using SHETRAN.

Technical Analysis of Diesel Engine Convert to Dual Fuel Engine for The Ship

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Abstract. Fossil fuel is the high-cost price. This trend of price is increasing and not stable. For the future is need alternative low cost and stable price fuel. Natural gas has low cost and stable price for alternative fuel. The objective of this paper is to analyse the effect of diesel engine converted to dual fuel engines using. The method of this paper is a mixture of HSD with CNG conducted on the ship diesel engine. The conversion is determining additional components required. Then, the reduction of the cargo for two cars for cylinder placement used. After the engine has been changed to dual fuel, the performance investigated. The performance investigation is based on the variation of HSD and CNG fuel composition in the engine. The result has shown that the best performance is when the 30: 70 of CNG: HSD mixture composition.

Dectection of Trend Behaviour of Extreme Rainfall Over Java Using Mann-Kendal

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Abstract. The purpose of this research is to detect the area that is impacted by climate change in Java Indonesia by creating a model that analyse the trend of extreme rainfall distribution for the last 30 years. Man Kendal test is used as a metode to detect the stationary or non-stationary behavior that will determine the happening of climate change or not in that area. The result of this research give an information that a lot of places in java are actually impacted by climate change. This result is crucial to use as an early warning of places that are sensitive to natural disasters that are most likely caused by climate change like flood and landslide.

Bias Correction of A Single-Forcing Dynamic Ensemble of Wave Climate Projections Towards The End of The 21st Century

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Abstract. A quantile-based bias correction methodology is applied to a 7-member CMIP5-derived dynamic single-forcing ensemble of wave climate simulations. The technique is designed to mitigate the significant wave height (H_S), mean wave period (T_m) and mean wave direction (MWD) biases, with reference to the ERA-5 reanalysis, during the 1979-2005 reference period (present climate). The same bias correction parameters are applied to the H_S, T_m (and wave energy flux; P_w), and MWD future climate projections, for the 2081-2100 period, and the correspondent projected changes are assessed. After the bias correction, projections show increases in the annual mean H_S (14%), T_m (6.5%) and P_w (30%) in the southern hemisphere, and decreases in the northern hemisphere (mainly in the North Atlantic), more pronounced during local winter. For the upper quantiles, the bias corrected projected changes are more striking during local summer, up to 120%, for P_w. After the bias correction, the magnitude of the H_S, T_m and P_w original projected changes has generally increased, showing the relevance of a quantile-based bias correction methodology in the estimation of the future projected changes in wave climate, able to deal with the misrepresentation of extreme phenomena by the forcing global circulation models (GCMs), especially along the tropical and subtropical latitudes.

Is There Is Any Gender Difference on Psychological Preparedness for Potential Disaster of University Students

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Abstract. Indonesia geographical condition has made the country prone to disaster. The National Disaster Mitigation Agency (BNPB) reported that there are 1.549 disasters happen in the first half of this year. One of global disaster that not only affect Indonesia but also country al around the globe is Covid-19 pandemi. The impact of the pandemi is not only experienced by highly developed world but also under developed world including Indonesia. Disaster in any form has bring a significant impact on individual mental health especially to the survivor. Study found that one of the factor that could reduce the psychological impact of disaster is psychologica preparedness for disaster. It is also state in the previous study that gender has play a role inidividual psychological peparedness. Athough there had been several findings in psychological preparedness for disaster, however gender difference in psychological prepareedness in the context of university students is still remain in question. Therefore, aim of this research is to investigate gender dfference in psychological preparedness of university students. The study was conducted in Surabaya. Survey research was applied using a Psychological Preparedness for Potential Disaster scale as a mean to identify the psychological preparedness of the participants.

Did Socioeconomic Status Influence Psychological Preparedness for Potential Disaster of Resident Around Lapindo Mud Disaster

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Abstract. Lumpur Sidoarjo or known as LUSI is geologica disaster that has been going on for 14 years since 2006. It is consider as the worlds largest mud volcano eruption. It bring tremendous impact to the livelihood of the resident live arond the site. People live around the site mostly relied on the ponds as a living thus LUSI a bring a devastated impact to the loca comunities. The condition has bring negative impact not only to their economic conditon but also to their mental health. Study found that there are growing number of people live around the site that experience psychological problem. Psychological preparedness for disaster is one of the factors that could help people in coping with stress after disaster strike. Previous study has found that most of the resident live around the LUSI site has average levelof psychological preparedness. Research on psychological preparedness found that one of the factor that associated with psychological preparedness is socioeconomic status. It is said that people with low socioeconomic would also have a low level psychological preparedness. However, the relationship between socioeconomic status and the psyholgical preparedness in resident around LUSI was unclear. Therefore, this study aimed to investigate the relationship between socioecoomic status and the psychological preparedness for potential disaster among resident around LUSI. The study was conducted in Sidoarjo. Survey research was applied using a Psychological Preparedness for Potential Disaster scale as a mean to identify the psychological preparedness of the Sidoarjo people.

Developing of Emergency Safety Device Module Under Vessel Integrated Automation System for Dual Fuel Diesel Engine

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Abstract. Using gas as a fuel of the ship's main engines give challenges in term of efficiency, fuel prices, low emission, and safety behavior. Gas characteristics need particular attention due to higher flammable, explosive, and hazard gas leakages. Adopting gas as fuel onboard a ship insists on a higher level of safety as guided by the IGF Code. Conventional safety devices installed in the conventional diesel engines only aware of its combustion sensors. This study intended to develop a new PLC module that is capable of an automatic stop of the dual fuel diesel engine under any programmable emergencies. The developed module is integrated under the Vessel Integrated Automation System. The logical program manages the system to assure the continuous fuel service and stop the system when pre-defined hazards happened. Hazards are predicted from excessive pressure and temperature, flow rate, and gas leakages. The module in a form of software and hardware will be built using industrial tools.

Effects of Fairlead Positions on The Dynamic of Mooring System of Turbines-Loaded Quad-Spar

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Abstract. This paper deals with an analysis of a mooring system of quad-spar platform type, which is used to prop the tidal current turbines. The mooring system can provide attenuation of the quad-spar motion responses which might be useful for maintaining the turbine efficiency. Fairlead position of the mooring system is an important parameter that may influence the dynamic response of the quad-spar. A simulation has been done in this study by Computational Fluid Dynamic (CFD) using nonlinear analysis. The quad-spar may be installed on the strait with typical tidal current energy potentials and water depth (D) of 35 m. The variations of the fairlead position are determined as functions of the water depth which are 0.83D; 0.91D; 1D and 1.05D m for four catenary cables. Each of these positions was analyzed under ultimate (ULS) and accidental (ALS) limit states with the wave period, T, of about 1.5 to 6 s. The environmental load was set on the irregular wave with significant wave height, Hs, of about 0.09 to 1.5 m. The wave model used International Towing Tank Conference (ITTC) wave spectrum on the wave frequency, ω, of about 1.1 to 4.2 rad/s. In this case, the lowest motion responses and maximum cable tension are in the 0.8D m where is located at the lower end of the buoyant leg structures. The right selection of the fairlead position contributes to maintaining low motion responses and maximum cable tension.

Conceptual Design of The LNG Dual-Fuel System for Harbour Tug Towards Indonesia Greenport

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Abstract. Declaration of several large ports as Greenport indicates that increasing the environmental concern of port operatio n in Indonesia. Harbour tug as one of the port's operational supports is also required to contribute low emissions. One method to reduce exhaust emissions from tugboats is to replace the use of fuel oil with natural gas. This study describes the conceptual design of a dual-fuel LNG system at the harbour tug vessel for operational needs at the Indonesian port. The 2x2500 HP Harbour Tug, which is the case in this study, uses a dual fuel diesel engine as a prime mover with a direct mechanical propulsion system. Study optimization considering the operational mode of a prime mover will determine the LNG storage capacity, due to harbour tug vessel operation and space capacity as well as of bunkering system. The design parameters for the main components of the fuel system, such as the Regasification Unit, Gas Valve Unit are essential considerations to support the system's operation optimally.

Modeling of Unidirectional Oscillating Buoy Wave Energy Converter Based on Direct Mechanical Drive System Under Irregular Wave

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Abstract. The development of wave energy converters (WEC) is increasing over time with various designs. The need for a WEC design that emphasizes the level of simplicity, portability, and closeness of its implementation to the nearshore is quite interesting to discuss. One of the WECs that can meet these criteria is oscillating buoy based on a direct mechanical drive system. This research proposes the concept of oscillating buoy WEC based on a direct mechanical drive system, which is designed with a unidirectional gear system to be able to generate energy both in the upward and downward wave phases. The WEC is also making to produce high rotation on the output side from the small motion of the buoy, especially in the heave direction. Predicting the power generated by this concept is very interesting because up to now, there has not been sufficient analytical model to estimate the power generated by oscillating buoys WEC based on a direct mechanical drive system, especially under irregular waves. In this work, an analytical method is conducting to describe the interaction between the model and irregular waves from the JONSWAP model. Model interaction is simulating numerically using the MATLAB program. The buoy translational motion of the model in the heave direction, which is converting to electric power by increasing the rotation of the gearbox and the energy stored in the flywheel, can produce significant output power. In the future, the proposed model can be used to develop more feasible and efficient models of wave energy converters.

Analysis The Effect of P-Delta and Scouring on Fixed Offshore Structures Integrity

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Abstract. In the operation of fixed offshore structures, there are two problems that affect the integrity of jacket structures, there is the P-delta effect (P-Δ effect) and scouring problem. The approach taken is the Static Analysis approach. The method used is a sensitivity analysis of structural stress changes due to the P-delta effect and scouring depth. The structure is analyzed with variation of P-delta and scouring depth to determine the integrity of the structure when it changes the conditions of its design. The analysis using SACS software. Based on the results of the analysis, maximum allowable scouring depth, the stability criteria of the API RP 2A WSD for scouring on one leg is 9.5m; for scouring on two leg and three leg is 3.2m. The biggest increase in stress analyzed occurred at P-delta 15% and scouring with a depth of 21m occurred at three feet. H23 members in the jacket leg have maximum stress increase 307% from the initial UC of 0.41 to 1.68. The 203L joint in the joint can have a maximum stress increase 339% from the initial UC 0.660 to 2,898. The PL1 pile in the vertical leg have an increase in stress which causes a decrease in the SF compression pile 17% from the initial SF 1,428 to 1,178.

Fatigue Life Analysis of Mooring System: The Effect of Asymmetry Mooring System Configuration on Single Point Mooring

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Abstract. This journal explains the fatigue life analysis of anchor chain in the Single Point Mooring with stand-alone conditions by comparing the 4x1 asymmetric and symmetrical mooring system configurations to find out how the asymmetrical effect of the mooring system configuration on the fatigue life of the anchor chain is related to the length of the mooring lines, the pretensions of the mooring lines, and the angle of spread. The analysis was reviewed on the condition of ULS and FLS environmental loading based on API RP 2 SK code using Orcaflex with 3 hours of time- domain simulation. In the ULS condition, the symmetrical configuration is better able to withstand environmental loads in the direction of 0° and 180° because the results of the maximum tension and maximum offset are smaller than the asymmetrical configuration of 730.51 kN (Heading 0°) and 762.23 kN (Heading 180°) for maximum tension and 5.94 m (Heading 0° and 180°) for maximum offset. While the asymmetrical configuration is better able to withstand environmental loads in the direction of 90° and 270° because the results of maximum tension and maximum offset are smaller than the symmetrical configuration of 53.31 kN (Heading 90°) and 47.87 kN (Heading 270°) for maximum tension and 4.95 m (Heading 90°) and 4.72 m (Heading 270°) for maximum offset. In the FLS condition, the asymmetrical configuration has a longer minimum fatigue life of anchor chain which is 291 years with a design life of 97 years than the symmetrical configuration which has a minimum fatigue life of anchor chain which is 207 years with a design life of 69 years. This happens because of several factors, namely the spread angle of the mooring line, the length of the mooring line, and the pretension of the mooring line.

The Combination of Reliability and Predictive Tools to Determine Ship Engine Performance Based on Condition Monitoring

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Abstract. The evolution of maintenance has experienced developments in the fourth generation since the beginning of 2000 to the present. The fourth generation is the latest generation that focuses on condition based maintenance, condition monitoring and failure eliminations. The maintenance strategy in the fourth generation aims to reduce the failure rate of an equipment by reducing the probability, based on preventive and predictive approaches. In this research, a maintenance approach was carried out by predicting the results of condition monitoring on ship engine to ensure performance. The concept developed is to use a combination of reliability tools for criticality assessment and predictive tools to determine diagnostic assessments. Reliability tool for criticality assessment is the Failure Mode and Effect Criticality Analysis (FMECA) based on the fuzzy logic approach. FMECA's bottom-up approach is intended to explore failure modes that provide potential failure in the main engine system. The fuzzy logic theory added to FMECA accommodates uncertainty due to obscure information as well as subjective preference elements that are used in the assessment of failure modes. The predictive assessment process uses the Multilayer Perceptron (MLP) approach using the Artificial Neural Network (ANN) method. ANN has advantages for self-learning, adaptivity, fault tolerance, nonlinearity, and advancement in input to an output mapping. The results of the current diagnostic assessment indicate the condition of the main engine is still normal. However, the trending of exhaust gas temperature prediction shows an increase, combustion and compression pressure which shows a decrease need to be prepared for determining the inspection/survey schedule. In this research, predictive assessment using an Artificial Neural Network based on Multilayer Perceptron (MLP) has been validated with an error of less than 5%.

Analysis of Work Accident Factors in The Shipyard

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Abstract. In the shipbuilding industry, the majority of ship accidents are caused by human error. other factors are caused by the work environment, company conditions, management policies and others. These data show that human factor has a major impact on accidents. Therefore, a proper prevention is required. The purpose of this research is to determine the relationship between individual characteristics and work accident factors as well as to determine the prevention of work accidents. The method used in this paper is bivariate method. Then, the analysis was conducted using the chi square approach. The result of this research showed that age has a relationship with knowledge of engineering and skill. It has meaning that older workers would most likely understand in engineering better than the younger ones. Work pressure also has a relationship with age. It has meaning that the workers with an age of <35 and >45 have more work pressure than those with an age of 35 - 45. Furthermore, tenure and education do not have a relationship with work accident factors. Thus, some efforts are needed to minimize work accidents, such as providing in-class training to new workers, doing on-job training or field training, providing assistance on every job, exchange of workers from one place to another, sharing sessions on static electricity to young workers, creating a comfortable work atmosphere, provide adequate facilities, provide training on stress management and decision making.

Evacuation Analysis of Ship Passenger Using Agent Based Modelling Simulation

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Abstract. Ship accidents that occur in Indonesian have a high frequency. The ship accidents is dominated by fires of Ro-ro or passenger ships which cause material loss, water pollution and loss of human life. In this paper, an analysis of the ship evacuation system will be carried out. The Agent Based Modelling Simulation (ABMS) was using in this study. Initial data required are in the form of ship general arrangement, passenger walking speed, as well as the composition and distribution of passengers. The distribution of ship passengers in Indonesia for the category of women aged less than 30 years is 12%, women aged 30-50 years are 21%, women aged greater than 50 years are 5%, there are no female passengers with disabilities, while for the category of males aged less than 30 years as much as 19%, males with an age range of 30-50 years as much as 31%, males over 50 years old as much as 12%, and no male passengers were found. a man with a disability. The number of ship passengers is conditioned to exceed the passenger capacity, namely 880 passengers should be conditioned to become 1527 passengers. The evacuation simulation of ship passengers using an agent based modelling simulation is run based on the IMO MSC.1 / Circ. 1533 using 4 cases during the day and night. In the case of a normal night it takes 38.24 minutes to evacuate all passengers, and in the case of a night the evacuation takes 36.45 minutes. In the normal day case it took 29.49 minutes and in the afternoon case the evacuation took 28.12 minutes.

Hybrid Photovoltaic-Thermal Solar System for Brackish Water Reverse Osmosis

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Abstract. In this paper, a hybrid combination of solar thermal collector and photovoltaic (PV) solar system was applied to reverse osmosis (RO) desalination plant to increase the energy efficiency and its sustainability. An experimental study was performed on 75 GPD small scale RO plant using processed brackish/saline groundwater in Kenjeran area. It shows that increasing in temperature of feed raw water results a decrease in pump pressure and the consumption of electrical power. The smallest result of pump pressure which is 40 psi and the smallest electrical power consumption which is 1.68 W were obtained when the temperature is at 40 °C. However, the quality of the product, the amount of water, and the ability of the membrane to recover salt are decreasing when the temperature of the feed water is raised. The best result was obtained at 31 °C with a water product quality of 105 ppm, the amount of water produced was 36.5 L, and a salt rejection ability is 95.9%. The electrical power consumption of whole system for one day is 914.63 Watt-hours and requires six units of 155 Watt-peak capacity of PV panels.

Design of Reverse Osmosis Desalination Plant at Remote Coastal Area

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Abstract. During the long dry season hit most parts of East Java in 2019, there were 566 villages in 180 sub-districts that are categorized as dry areas with critical clean water supply, 236 villages in 93 sub-districts as rare dry areas, and 20 villages in 14 sub-districts experience limited dryness. In big cities in Indonesia, clean water service coverage has only reached 64.3%, while in rural areas still at 69.4%. This proves that most of the regions in Indonesia still experiencing a clean water crisis. Therefore, alternative clean water processing technology is needed to help supply clean water in these areas. Desalination as one of the technologies is essential for coastal areas that are remote from freshwater resources. In this paper, authors propose a design of photovoltaic reverse osmosis (PVRO) desalination plant at remote coastal area to supply clean water. A 100 m3/day design of PVRO, which is compact and energy efficient including the ultrafiltration method is introduced.

Study on Shoreline Evolution Under Influenced of Jetty Construction: A Case Study of Karangsong Beach, Indramayu, Indonesia

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(Invited Speaker)

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Abstract. Karangsong Beach, Indramayu located on the north coast of Java Island of Indonesia has been an important traditional small downstream river port for the fishermen who live in the Indramayu District area. This traditional port has been rehabilitated by construction of jetty in the period 2005 to 2007. The jetty construction affected coastal process, which was previously dominated by erosion turned into dominated by accretion. This study examines the process of shoreline evolution by calculating the sediment transport rate and analyzing the shoreline changes. The analysis began by extracting shoreline data from Google Earth image to provide a historical database of shoreline. The coastal process was then simulated using the coastline model Uniform Beach Sediment Transport Coastline (UNIBEST-CL) with waves and the longshore component of tidal currents as input and also calibrated using the shoreline database. The calibrated model was employed to simulate the annual conditions over a nine-year period, 2008-2017. The results show the sediment transport rate is dominated by the southeast direction. There is a significant difference in coastal processes between northern and southern regions, which is due to the presence of jetty. In the northern region, the sediment transport rate was blocked by the jetty so that this region is accreted. In the southern region, the supply of sediment from the north replaced by sediment supply from the river causes accretion yet smaller than the northern region.

Analysis of Extreme Events Through HF Radars Wave Height Observation in The Southwestern Iberian Peninsula

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Abstract. The Iberian Peninsula is strongly influenced by low-pressure systems tracking from the mid-Atlantic Ocean, that gives rise to storms and severe sea states, mostly during winter. The south coast of the Peninsula is a region with intense maritime traffic between the Atlantic and the Mediterranean, thus a comprehensive characterization of the wave height events is mandatory to increase marine safety in these coastal areas and minimize the associated risks. *In situ* observations allow continuous monitoring of coastal areas and the production of reliable wave climate statistics. But they also can benefit from higher resolution and the improved temporal sampling provided by High Frequency Radar (HFR). This study evaluates the skills of CODAR *SeaSonde* HFR sites in the southwestern Iberian Peninsula coast on measuring wave parameters during extreme wave events. HFR wave height observations have been compared to wave buoys and Sentinel-3 satellite altimeter (SA) wave measurements. HFR systems can measure ocean wave parameters up to 30 km from shoreline. On the other hand, SA can be less accurate in nearshore areas. A combined observational strategy between *in situ* and remoted sensed sensors during extreme wave height events, can provide a wide wave monitoring analysis in coastal areas. Encouraging results show the potential of HFR to capture extreme wave events. With suitable improvements, *in situ* wave monitoring gaps along coastal areas can eventually be overcome by HFR wave measurements.

Velocity Profile and Turbulence Characteristics Over Coral Reefs in Derawan Island, East Kalimantan

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Abstract. Turbulent boundary layer dynamics over coral reef communities control many biologically important processes, including food capture by benthic organisms, mass transfer of dissolved nutrients, larval dispersal, waste removal, and sediment transport. All of these processes are controlled by hydrodynamic mechanism are directly related to the shear and turbulent mixing. Motivated by the importance of boundary layer dynamics to both large and small scale ecological processes on coral reefs, this study aims to investigate velocity profiles, the turbulence parameters and boundary layer flow over a coral reef. Moored measurements on currents and turbulence were conducted at the three coral reef sites in Derawan Island, East Kalimantan. Velocity profiles were inferred from Acoustic Doppler Current Profilers (ADCP). The velocity data showed logarithmic profile up to ca. 3 meter from the bed, sometimes even up to nearby the surface (14 meter). Reynolds shear stresses and turbulent viscosities were derived from ADCP data by using the beam variance method. The data profiles showed fairly well with theoretical of previous study for the coral reef boundary layer. Boundary layer parameters, such as the friction velocity and roughness length, were determined by fitting a logarithmic profile to the velocity data. The time scale analysis showed that mesoscale fluctuations were present and the characteristic turbulence time scale varies an order of magnitude in time. This time scale is uncorrelated with mean velocity or tidal phase. Apparently several turbulence regimes are prevalent, presumably caused by the inhomogeneity of the bed roughness, and therefore dependent on subtle water flow direction variations. These turbulence regimes may be self-preserving for variable time periods, explaining the observed complexity.

Estimation of Total Suspended Solids Using Satellite Sentinel-2 on The Pamekasan District

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Abstract. Total suspended solids (TSS) are a dissolved sediment particle in water which can affect water conditions such as turbidity, stability of coastal, and estuaries. TSS are also become the important indicator of coastal stability. Most of the studies in TSS on Madura strait are generally based on in-situ measurement using a simple instrument, which are only provide the data in specific time and location. Pamekasan district is one of the region and important for some activities, i.e. coastal protection. The previous studies have a lack of spatial data due to use a simple approach and device, therefore we propose the remote sensing approach to estimate the TSS in spatial and temporal variation using Sentinel-2 satellite image Level-1C. We used SNAP and QGIS to processing and analyse image. First steps on this method is top of atmosphere, and the next steps is bottom of atmosphere correction. Calculate band used TSS algorithm are proposed by Jaelani. The preliminary result showed some specific area have a difference TSS concentration with other area. We summaries the result for figuring out the important factor that influence to the TSS fluctuation in the study area.

Variation of Seasonal Monsoon Wave-Driven Circulation Pattern in The Lee of Groyne in Kuala Nerus Beach (Malaysia)

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Abstract. Terengganu beach tend to dual monsoonal as presenting Northeast Monsoon (NEM) as a storm season and Southwest Monsoon (SWM) as a calm season. The area of interest is a groyne located in Kuala Nerus, Terengganu on east part of Peninsular Malaysia. In Kuala Nerus, the groyne are built because to protect the beach nourishment program in erosion area. However, can be affect the wave and current and creating more erosion to other beaches. In identify the effect of the wave and current on beaches, the numerical model was performed on the dual monsoon seasons with MIKE 21 modules (Spectral Wave FM and Flow Model Hydrodynamic FM modules). Two numerical model were set up according to the two seasons of NEM and SWM. The resulting model indicates, the current circulation pattern consisted of persistent eddy re-circulation in the lee of the groyne during both seasons. As the longshore current directed into the groyne, it deflected offshore resulting in rip current along the groyne. The rip current and incoming wave converge at the tip of the groyne and flow parallel to coastline before being projected onshore performing a re-circulation cell. During NEM, the model shows a clockwise re-circulation cell and counter-clockwise formation during SWM. The formation of the rip current and eddy circulation is associated with erosion event as the sediment transported offshore causing sediment shortage on the adjacent shore. The importance of this study can be a reference to any development of coastal defense monsoon dominated environment.

Parameters Influence the Stability Test of The Coastal Structure's Model in The Laboratory

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Abstract. The design of coastal structures requires accurate data and appropriate formula to make them stable and durable. Sometimes, the availability and accuracy of the data in the location of the coastal structure are insufficient. Moreover, the selection of formula used in design, sometimes does not suitable with the location of coastal structures. Therefore, the design of coastal structures prior to construction need to be tested in the laboratory with a physical model test. Based on previous studies, various parameters that affect breakwater stability in physical model testing includes :

1) wave parameters such as wave height, wave period, wave type, wave spectrum, wave direction, breaking wave condition and number of wave attack.
2) water levels parameters such as overtoping and non overtoping wave and submerged condition,
3) armor unitstability and methods of placements 4)shape of the coastalstructures such as the slope of structure, number of layers, structure position, etc This paper discussed and evaluate the influences of those parameters to the stability of coastal structures.

Utilization of GPS Technology in The Maritime Sector on Motor Sailing Yachts

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Abstract. The utilization of technology only aims to be fast, precise, and accurate in each implementation and find a better solution at that time in several sectors. This study aims to identify the use of Global Positioning Technology (GPS) technology to track the position of the motor sailing yachts, specifically with the features used on a device or smart-phone during a trip or expedition. This research uses a type of applied research to solve problems that are faced clearly, and the results can be used as a basis for solving corrective steps. The results found that GPS-Technology on motor sailing yachts in "Pelayaran Rakyat" maritime can receive coordinates point and then send these coordinates to the vessel-tracking systems to determine the position of the motor sailing yachts between users.

Hydrodynamic Properties of Moored Floating Breakwater Using CFD Method

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Abstract. In presence of complex-hydrodynamic interaction between water wave and moving structure, a reliable method that can analyse nonlinear phenomena is necessarily required. This paper presents numerical investigation of a moored floating breakwater using computational fluid dynamic (CFD) approach. The mathematical model is based on the extended Reynolds Average Navier-Stokes (RANS) solver for solid-porous obstacle. A high amplitude wave with several wave periods were deliberately considered in the simulation to allow nonlinear wave effects on the floating structure such as wave breaking, overtopping, including viscous friction. Here, the two-fluid calculation method for interface boundary between water and air is proposed to capture the complex free surface changes. In addition, the fractional average volume obstacle representation (FAVOR) using partial cell treatment method is employed to simulate the motion of breakwater boundary on the free surface. Approximations and validations on the hydrodynamic properties of the structure have been carried out which include wave transmission coefficient, sway, heave, pitch, and mooring forces. The results show that the CFD model can fairly simulate well on hydrodynamics of the floating breakwater. The discrepancies between numerical and experimental data can be partly attributed to the nonlinearity in the incident wave definition.

Utilization The Ship Main Engine Cooling Water for Micro Hydro Power Plants Design

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Abstract. Renewable energy is non-fossil energy derived from the nature and sustainable, also if properly managed, resources are depleted. The utilization of cooling water disposal on his boat as an energy-producing environment-friendly, by making use of the cooling water flow pressure machine ships as water turbine impeller assembled in such a way so it can generate electricity. Commercial ships usually have large size machines and most use large-capacity cooling system, so the cooling water flow capacity will be even greater as well. This prompted the opportunity to create an instrument for utilizing renewable energy flow of cooling water disposed in vain to rotate the propeller has been drafted into a micro hydro. And expected results can help reduce the workload of the auxiliary engines which will also have an impact on the reduction of fuel consumption. Fluid which flowed by the pump-the pump will rotate the intended water turbine that will generate electrical energy. When the ship sail, the lighting definitely need in each room, by using the electrical energy produced by the auxiliary engine, this water turbine can be applied then the fuel that had been used or consumed by the auxiliary engine can be replaced by the electric energy generated by the water turbines for light ships.

Monte Carlo Simulation for Reliability Hydraulic Stability of Rock Rubble Mound Breakwater at PLTU Sudimoro, Pacitan

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Abstract. In calculating of breakwater design, one of the methods developed is conventional method. This method is based on the concept of load, where the design load should not exceed the carrying capacity of the structure. The design load itself can be identified using probabilistic means, such as looking for the average value of a 60-years wave return period so that wave data is needed that will be further processed. Most of the design formulas available only provide a link between wave characteristics and some structural responses, such as run up, runoff (overtopping), armor layer damage, etc. In this Research, a reliability analysis of hydraulic stability is performed with *monte carlo* simulation. The formulas used in hydraulic stability calculations are the *Hudson* and *Van Der Meer* formulas. The result is the breakwater structure in Pacitan Power Plant already meets the hydraulic stability design criteria in accordance with *Hudson* and *Van Der Meer* formula with reliability 98,8% (*Hudson*), 95,12% (*VDM*). For author design reliability with Dolosse protective stones, BPPT Loc and Tetrapod have reliability values of 94%, 94,03%, and 94,1% (*Hudson*) and 79,28%, 79,11%, and 78,94% (*VDM*) respectively.

Analysis of Leading Edge Protuberances on Fully Submerged Hydrofoil of 15 Meters Pilot Boat

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Abstract. Resistance greatly affect on selection of the main engine and ship fuel consumption. To achieve the speed of the ship, the ship must be prepared to overcome resistance in the waters to be passed by choosing the right engine according to the needs of the ship. In the last few years there have been many studies on biomimetics or the use of systems in nature to be applied in a technology. Such as the use of Leading edge protuberances. Despite its large size and stiff flexibility, the humpback whale has a good maneuver even when chasing prey compared to other animals of its size. This study aims to obtain the highest lift force result and the smallest resistance with a hydrofoil model configuration of leading edge protuberances which resembles a humpback whale fin (megaptra novaengliae). The Computational Fluid Dynamics (CFD) is applied to analyse lift faorce and ship resistance of all models variation. The results indicates that from all variation of models at the Fn 1.356, the model has 5 ° angle of attack were able to reduce the total resistance value of Pilot Boat by 35.13%.

Floating Photovoltaic Design for Isolated Coastal Village in Indonesia

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Abstract. This article present the design of modular floating photovoltaic farm to supply electricity for isolated island villages in Indonesia, which could reach annual electricity house hold 1481 KWh. Floating photovoltaic farm must easy to install and deliver to isolated coastal village Indonesia, and modular floating farm necessary strength on the operation at Indonesian environment. Floating photovoltaic body was designed with polyethylene module type part. To evaluate the strength of Floating photovoltaic, the structure analysis simulation was carried out with respect to stress and displacement. Maximum stress was 2.41 MPa and it was below allowable stress of base material.

Mapping Oil Spill Using Sentinel-1 : Study Case of Karawang Oil Spill

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Abstract. Indonesia as a maritime country has many challenges in developing and making innovations in the marine sector. One of the challenges for Indonesia is how to respond to oil spill disasters that occur because of various events such as blow-out on oil platforms, ship collisions, pipeline leaks, and so on. In the end, marine and coastal pollution cannot be avoided. Karawang is one of the productive northern coastal areas of Java Island with various facilities such as single point mooring, oil wells, tourist areas and historical heritage. On July 15, 2019, an oil-well belonging to Pertamina Hulu Energi (PHE) ONWJ had leaked and polluted the sea and coast not only in Karawang, but also spread to Jakarta waters. As a result of this leakage, of course the impact is very large and varied from ecological, social and economic aspects. In this paper, an oil spill mapping will be carried out to determine the affected areas using sentinel-1 data. Data processing is assisted by open-source software SNAP (Sentinel Application Platform). As the result, August 19, 2019, oil spill seen in Bekasi area. So that oil slick move from Karawang to the west. This oil spill map area can be used in many ways such as clean-up strategy, calculating amount of dispersant, and many more.

Temporal and Spatial Analysis of Mangrove Forest Change in The North Coast of East Java

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Abstract. The north coast of East Java has high human activities and needs. These human needs include opening new land for housing areas, so that some mangrove areas have begun to be converted into residential areas. This can directly cause ecological impacts that threaten the sustainability of the coastal environment, but on the other hand, mangrove areas on the north coast of East Java are also developed as conservation and tourism areas. The purpose of this study is to determine changes in mangrove area and changes in coastlines in the northern coastal region of East Java during the period 2013 to 2019 based on Geographical Information Systems (GIS) using the Supervised-Maximum Likelihood image classification method. The results of this study showed that the largest change in mangrove forest area was in Sidoarjo Regency by 95%, while the lowest change in mangrove forest area was in Tuban Regency at 7.20%.

Safety Case Development for Risk Management of Offshore

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Abstract. Offshore pipeline is an indispensable component that plays a huge role in the distribution of hydrocarbon products. Thus, it is necessary to prevent any kind of incidents that may bring harm to the offshore pipeline system. Therefore, this final project is intended to develop the structure of Safety Case Document which provides preventions and mitigations actions and serves as risk management platform for offshore pipeline. Offshore pipeline that was specifically being used as a data in this project is located at Northeast of Java Sea and possesses 1 km of length, and also a subject of pipeline leakage. The methods that was being involved in this project are as follows; Fishbone Diagram to identify the cause of the failure of the pipeline, Fuzzy FMEA to determine the Risk Priority Number in order to find out the priority of each failure cause, also HAZOP to provide the necessary prevention and mitigation actions in accordance to each cause and subsequently being structured as a whole Safety Case Document with appropriate Safety Management System which also the product of this final project. The structure of Safety Case Document consists of Objective and Facility Description, Formal Safety Assessment, and Safety Management System.

The Effect of Floater Modular Submersible Additional Buoyancy on Tension Mooring Line and the Motions of CBM (Conventional Buoy Mooring) Ø 4.5 m

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Abstract. Mooring buoy was designed as one of mooring equipment in offshore. Mooring buoy must capable to resist ship load in a certain environment condition. Generally conventional mooring buoy system consist of Mooring Buoy and mooring leg, where the buoy is moored to the seabed using mooring line to the anchor, sinker or pile based on the seabed type. Mooring components, such as mooring chain, fittings, anchors, sinkers, and buoys, must sustain anticipated loads without failure. The weakest part on conventional mooring buoy system is mooring line. Mooring line generally made of chain, sling, and polyester rope. Catenary chain or wire have their own weight to reduce loads.

Ocean Current and Sediment Reduction : Simulation with Delft3D in Rejoso Shoreline

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Abstract. Rejoso estuary, located 3 kilometers from the center of Pasuruan, has an unstable river mouth that threatens the existence of residents in the surrounding area. During the rainy season, when high discharge in the river meets high tide from the ocean, flooding occured in residential areas located around the coast. It happens due to sediment deposits formed near the sea and ocean current that worsen the backwater. East Java Provincial Water Resources Agency plans to build a jetty in that area to reduce sediment deposition caused by longshore sediment transport and to protect the estuary from ocean currents. This study aims to look at the impact of jetty construction that is affected by wave and current activity by performing numerical modeling with Delft3D software. From the simulation results, jetty reduce the amount of ocean current with the biggest reduction at monitoring point A is 0.299 m/sec (94.05%) and decrease sedimentation with the biggest at monitoring point A by 91.37% in the east side of the estuary. In conditions without a jetty, the shape of the shoreline and the elevation follows the shape of the initial shoreline, while after one year with jetty the sedimentation occured to the end of it.