

DESIGN AND MODELING OF WAVE ENERGY CONVERTER

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DESIGN AND MODELING OF WAVE ENERGY CONVERTER

BY

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UK 21673

**A Research Report Submitted In Partial Fulfillment of the Requirements For The
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**DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
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**DEPARTMENT OF MARITIME TECHNOLOGY
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**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled:
Design and Modeling of Wave Energy Converter by Noor Muhamad Fareez bin Fauzi,
Matric No: UK 21673 has been examined and all errors identified have been corrected.
This report is submitted to the Department of Maritime Technology as partial fulfillment
towards obtaining the Degree of Bachelor of Applied Science (Maritime Technology),
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DESIGN AND MODELING: WAVE ENERGY CONVERTER

ASBTRACT

The growing current interest in marine renewable energy as the source of generate electric to replace the main source which is fossil fuel due to the problem that the whole world facing the depleted of the main source. Chosen of marine renewable energy such as *ocean wave*, *ocean tidal* and *ocean thermal* for the primary sources for generating electric has been seen a best solution because the energy form are continuously and also free-green-energy. In this study, the interaction between regular water waves, wave energy converter based oscillating water wave column and overtopping concept geometry is presented. Water wave are generated in numerical wave tank within the wave energy converter with the commercial CFD software, Fluent. The VOF method has been applied to form wave generation and the water and air interaction. Flow is assumed to be viscous, unsteady and incompressible for the numerical model. This thesis presents the result of simulation of wave energy converter concepts for which specifications of the model is the best for final recommendation.

Keywords: *CFD, Fluent, wave energy converter, simulation, VOF, numerical model*

REKA BENTUK DAN PERMODELAN: ALAT PENUKARAN TENAGA OMBAK

ABSTRAK

Peningkatan permintaan semasa terhadap penggunaan sumber tenaga marin yang boleh diperbaharui untuk mengganti sumber bahan api fosil yang merupakan sumber tenaga yang utama untuk menghasilkan tenaga elektrik, kerana permasalahan terhadap sumber bahan api fosil yang semakin berkurang di seluruh dunia. Pemilihan sumber tenaga marin seperti *ocean wave*, *ocean tidal* dan juga *ocean thermal* untuk menjadi sumber utama dalam menghasilkan tenaga elektrik dilihat sebagai penyelesaian terbaik kerana sumber tenaga yang dihasilkan adalah secara berterusan dan juga bebas dari pencemaran. Dalam kajian ini, interaksi antara ombak, alat penukar tenaga ombak yang berkonsepkan “*oscillating water wave column (OWC)*” dan “*overtopping*” geomteri di perkenalakan. *Ombak air yang dihasilkan dalam tangki ombak dengan penukar tenaga gelombang dengan perisian CFD komersial, Fluentt. Kaedah VOF digunakan untuk membentuk ombak serta interaksi antara air dan udara. Aliran diandaikan menjadi likat, tidak tetap dan dan tidak mampat untuk model berangka. Tesis ini membentangkan hasil simulasi konsep penukar tenaga ombak untuk pemelihan spesifikasi model yang terbaik.*