

Abstract

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Augmented Diffuser for Horizontal Axis Marine Current Turbine

The potential of renewable energy sources is enormous as they can make a major contribution to the future of energy needs. The ocean has a great potential to become a practical energy source compared to other energy resources such as solar, wind, and nuclear. It offers various sources of energy which can be utilized namely wave, tidal, offshore wind, thermal, and current. Among these sources, marine tidal current has major advantages such as higher power availability and predictability. The main objective of this research work is to design and develop a horizontal axis marine current turbine (HAMCT) that suitable for operation within Malaysian ocean, which has low speed current (0.5 – 1 m/s average). A design of augmented diffuser 4-bladed HAMCT applying NACA 0014 was detailed in this study. The turbine has 2.5 m diameter, and it was designed to produce a power of 1 kW. In order to predict the power that can be generated by the turbine a 1/3 scaled model was constructed and tested at Marine Technology Center (MTC) in three conditions, namely, free tow testing, ducted tow testing, and ducted diffuser tow testing. The results showed that the application of duct is significant to concentrate the flow and diffuser arrangement is effective when it is placed behind of the rotor in this condition of low water current speed