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Ajit Thakker, Mohammed A. Elhemry

3-D CFD ANALYSIS ON EFFECT OF HUB-TO-TIP RATIO ON PERFORMANCE OF IMPULSE TURBINE FOR WAVE ENERGY CONVERSION

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ABSTRACT

This paper deals with the computational fluid dynamics analysis on effect of hub-to-tip ratio on performance of 0.6 m impulse turbine for wave energy conversion. Experiments have been conducted on the 0.6 m impulse turbine with 0.6 hub-to-tip ratio to validate the present computational fluid dynamics method and to analyze the aerodynamics in rotor and guide vanes, which demonstrates the necessity to improve the blade and guide vanes shape. Computational fluid dynamics analysis has been made on impulse turbine with different hub-to-tip ratio for various flow coefficients. The present computational fluid dynamics model can predict the experimental values with reasonable degree of accuracy. It also showed that the downstream guide vanes make considerable total pressure drop thus reducing the performance of the turbine. The computational fluid dynamics results showed that at the designed flow coefficient of 1.0 the turbine with 0.5 hub-to-tip ratio has better performance compared to 0.55 and 0.6 hub-to-tip ratio turbine

KEYWORDS

wave energy, impulse turbine, computational fluid dynamics, hub-to-tip ratio

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