Abstract

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Experimental and Numerical Performance Evaluation of an Inverted Cup Float with Different Shapes for Wave Energy Conversion

Many researchers are focusing on modeling the floating point absorber. This is thought to be the most cost effective technology to extract energy from sea waves. This work is mainly investigating a new design of float experimentally and numerically. A complete analysis of its performance is introduced during the wave energy conversion. This new float consists of two parts a hollow cylinder and a hollow conical. Furthermore, the conical part at the lower part is working as an inverted cup fixed to float's bottom. Initially, the float is submerged in water with sufficient submergence. As water rises up due to the wave action, the float follows the water motion. However, during the water level ping, the enclosed water in the inverted cup is exposed to a negative pressure. This negative pressure helps the float simultaneously downward motion to follow the water wave motion without slamming. In this work, different shapes of this design of the floats have been tested experimentally and numerically. In the numerical part, the ANSYS - AQWA commercial code is applied to simulate the interaction between float and incident waves. Moreover, experimental evaluations have been conducted to investigate the interaction between the water wave and floats. In addition, a comparison between the simulations results and experimental data to validate the numerical model is presented.