

Title of Diploma Thesis

Array of Oblate Spheroidal Wave Energy Converters in front of a Floating Breakwater

Author

Kalliopi Adikimenaki

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ABSTRACT

The present thesis investigates the performance of a single, semi-submerged, oblate-spheroidal, oscillating in heave Wave Energy Converter (WEC) and of a linear array of three of the above WECs in front of a floating breakwater under the action of perpendicular to the arrangement regular waves. The diffraction and radiation problems are solved in the frequency domain using the conventional boundary integral equation method. The effect of the distance between the devices and the floating breakwater is examined assuming stationary and freely floating in heave floating breakwater. In the case of a single WEC, the results show that the placement of the device at a distance up to three times the WEC's radius from the floating breakwater causes interactions that improve the WEC's hydrodynamic behavior and power absorption ability. Considering the linear array, this holds true for a distance equal to four times the radius of the device. For all examined cases, the results also illustrate that the vertical motion of the floating breakwater does not enhance the hydrodynamic behavior and the power absorption ability of the WECs. On the other hand, the placement of the WECs in front of the floating breakwater has a positive effect on power absorption ability at most of the frequency ranges examined.

Keywords: Wave energy, Wave Energy Converters, Floating Breakwater, Hydrodynamic Interactions, Hydrodynamic Behavior, Power Absorption.