

Numerical Investigation of Wave Interaction with Double Vertical Slotted Walls

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Abstract : Recently, permeable breakwaters have been suggested to overcome the disadvantages of fully protection breakwaters. These protection structures have minor impacts on the coastal environment and neighboring beaches where they provide a more economical protection from waves and currents. For regular waves, a numerical model is used (FLOW-3D, VOF) to investigate the hydraulic performance of a permeable breakwater. The model of permeable breakwater consists of a pair of identical vertical slotted walls with an impermeable upper and lower part, where the draft is a decimal multiple of the total depth. The middle part is permeable with a porosity of 50%. The second barrier is located at distant of 0.5 and 1.5 of the water depth from the first one. The numerical model is validated by comparisons with previous laboratory data and semi-analytical results of the same model. A good agreement between the numerical results and both laboratory data and semi-analytical results has been shown and the results indicate the applicability of the numerical model to reproduce most of the important features of the interaction. Through the numerical investigation, the friction factor of the model is carefully discussed.

Keywords : coastal structures, permeable breakwater, slotted wall, numerical model, energy dissipation coefficient

Conference Title : ICMSE 2014 : International Conference on Marine Science and Engineering

Conference Location : Paris, France

Conference Dates : August 28-29, 2014