

Experimental and Semi-Analytical Investigation of Wave Interaction with Double Vertical Slotted Walls

Authors : H. Ahmed, A. Schlenkhoff, R. Roustia, R. Abdelaziz

Abstract : Vertical slotted walls can be used as permeable breakwaters to provide economical and environmental protection from undesirable waves and currents inside the port. The permeable breakwaters are partially protection and have been suggested to overcome the environmental disadvantages of fully protection breakwaters. For regular waves a semi-analytical model is based on an eigenfunction expansion method and utilizes a boundary condition at the surface of each wall are developed to detect the energy dissipation through the slots. Extensive laboratory tests are carried out to validate the semi-analytical models. The structure of the physical model contains two walls and it consists of impermeable upper and lower part, where the draft is based a decimal multiple of the total depth. The middle part is permeable with a porosity of 50%. The second barrier is located at a distant of 0.5, 1, 1.5 and 2 times of the water depth from the first one. A comparison of the theoretical results with previous studies and experimental measurements of the present study show a good agreement and that, the semi-analytical model is able to adequately reproduce most the important features of the experiment.

Keywords : permeable breakwater, double vertical slotted walls, semi-analytical model, transmission coefficient, reflection coefficient, energy dissipation coefficient

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