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Experimental and numerical studies of wave-rigid body interaction: Wave attenuation properties of a constrained floating breakwater[1]
PENG NINGNING, LAU WING KIN, The University of Hong Kong, LI YE, Shanghai Jiao Tong University, WAI O.W.H., The Hong Kong Polytechnic University, CHOW K.W., The University of Hong Kong — Interactions between surface gravity waves and a mounted rigid body are complex, as waves may reflect, refract, or even overtop the body. Studies of these phenomena are critically important in determining and improving the safety and efficiency of offshore structures. Here the motions of a floating breakwater held by wires to the seabed are studied through numerical and experimental approaches. A model of the floating breakwater with a scale of 1:20 is tested in a water channel with wave maker. Wave properties, current velocity and the constraint force of the floating breakwater are measured in the laboratory. Computationally, numerical methods utilizing the volume of fluid (VOF), six degree of freedom (6DOF) and fluid-structure interaction (FSI) schemes are used to simulate the motions of the waves and the floating breakwater. The performance of the floating breakwater in terms of wave attenuation is assessed by varying the wavelengths, wave amplitudes, and current velocities both computationally and experimentally. The motions of floating breakwater are also analyzed. Agreements between the experimental and numerical tests are encouraging.

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