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Fully-resolved wave-structure interaction simulations of a two-dimensional submerged point absorber with three degrees of freedom PANAGIOTIS DAFNAKIS, Politecnico di Torino, AMNEET PAL BHALLA, San Diego State University, GIULIANA MATTIAZZO, GIOVANNI BRACCO, Politecnico di Torino, SAN DIEGO STATE UNIVERSITY TEAM, POLITECNICO DI TORINO TEAM — A fully-resolved wave structure interaction (WSI) framework is developed to simulate a submerged point absorber. The WSI model is based on the fictitious domain Brinkman penalization method in which the solid body is treated as a porous body of vanishing permeability. For validating the model, forced damped-oscillation of a cylinder in various damping regimes along with several grid convergence studies are performed. The WSI model is compared against Cummins equation based Simulink model to demonstrate the differences between the potential flow theory and the nonlinear Navier-Stokes based methodologies. Time domain simulations are carried out for one, two, and three degrees of freedom buoy in order to analyze the surge, heave and pitching motion of the device using two methods. Furthermore, the WSI model is used to calculate the conversion efficiency of the point absorber for various wave and device parameters.

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