Abstract Submitted
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Computational modeling of pitching cylinder-type ocean wave energy converters using 3D MPI-parallel simulations[1] COLE FRENIERE, ASHISH PATHAK, MEHDI RAESSI, University of Massachusetts Dartmouth — Ocean Wave Energy Converters (WECs) are devices that convert energy from ocean waves into electricity. To aid in the design of WECs, an advanced computational framework has been developed which has advantages over conventional methods. The computational framework simulates the performance of WECs in a virtual wave tank by solving the full Navier-Stokes equations in 3D, capturing the fluid-structure interaction, nonlinear and viscous effects. In this work, we present simulations of the performance of pitching cylinder-type WECs and compare against experimental data. WECs are simulated at both model and full scales. The results are used to determine the role of the Keulegan-Carpenter (KC) number. The KC number is representative of viscous drag behavior on a bluff body in an oscillating flow, and is considered an important indicator of the dynamics of a WEC. Studying the effects of the KC number is important for determining the validity of the Froude scaling and the inviscid potential flow theory, which are heavily relied on in the conventional approaches to modeling WECs.

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