Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

A 3D MPI-Parallel GPU-accelerated framework for simulating ocean wave energy converters[1] ASHISH PATHAK, MEHDI RAESSI, University of Massachusetts Dartmouth — We present an MPI-parallel GPU-accelerated computational framework for studying the interaction between ocean waves and wave energy converters (WECs). The computational framework captures the viscous effects, nonlinear fluid-structure interaction (FSI), and breaking of waves around the structure, which cannot be captured in many potential flow solvers commonly used for WEC simulations. The full Navier-Stokes equations are solved using the two-step projection method, which is accelerated by porting the pressure Poisson equation to GPUs. The FSI is captured using the numerically stable fictitious domain method. A novel three-phase interface reconstruction algorithm is used to resolve three phases in a VOF-PLIC context. A consistent mass and momentum transport approach enables simulations at high density ratios. The accuracy of the overall framework is demonstrated via an array of test cases. Numerical simulations of the interaction between ocean waves and WECs are presented.

[1]Funding from the National Science Foundation CBET - 1236462 grant is gratefully acknowledged.

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Date submitted: 31 Jul 2015 Electronic form version 1.4