

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Computation of three-dimensional standing water waves CHRIS RYCROFT, JON WILKENING, UC Berkeley — We develop a method for computing three-dimensional gravity-driven water waves, which we use to search for time-periodic standing wave solutions. We simulate an inviscid, irrotational, incompressible fluid bounded below by a flat wall, and above by an evolving free surface. The computations make use of spectral derivatives on the surface, but also require computing a velocity potential in the bulk, which we carry out using a finite element method with fourth order elements that are curved to match the free surface – this computationally expensive step is solved using a parallel multigrid algorithm which we have developed. We search for time-periodic solutions using the trust-region shooting method that was previously used to find two-dimensional standing water waves.

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Date submitted: 06 Aug 2010

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