Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Computation of two-dimensional standing water waves JON WILKENING, JIA YU, CHRIS RYCROFT, UC Berkeley — We develop a quasi-Newton trust-region shooting algorithm for solving two-point boundary value problems governed by nonlinear PDEs. We use our method to compute families of (time-periodic) standing water waves in two dimensions. To evolve the water wave in time, we use a spectrally accurate boundary integral collocation method. As a starting guess, we use analytically determined time-periodic solutions of the linearized problem about a flat surface. We then use our numerical method to continue these solutions beyond the realm of linear theory to explore the topology and bifurcation structure of a two-parameter family of standing waves (with mean depth and wave amplitude as parameters). Preliminary results suggest that if limiting wave profiles exist, they have more complicated singularities than the 90 degree angles previously conjectured.

Jon Wilkening
UC Berkeley

Date submitted: 06 Aug 2010 Electronic form version 1.4