

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**Recovering** **water-wave**  
**profiles from bottom pressure measurements**<sup>1</sup> VISHAL VASAN, Pennsylvania State Univ, KATIE OLIVERAS, Seattle University, DIANE HENDERSON, Pennsylvania State Univ, BERNARD DECONINCK, University of Washington — Accurate measurements of the surface elevation are essential for understanding flow along coastlines. Often surface elevation is measured indirectly through pressure gauges situated on the bottom bed using linear theory. The full relationship between pressure and surface elevation is however significantly more complicated. In this talk we present a fully nonlinear formula that recovers the surface elevation profile of a traveling water-wave from measurements of the pressure beneath the wave. This is the first analytical investigation to take full nonlinearity into account. From this new relation, we derive a variety of different asymptotic formulas. Surface profile reconstructions from bottom pressure, measured using pressure gauges, are compared to actual heights obtained from surface capacitance gauges. Our comparisons indicate that a new asymptotic reconstruction formula affords significant gains over the traditional approach. Further, it is rapid and easy to implement, requiring only three Fourier transforms.

<sup>1</sup>This research was supported by the National Science Foundation under grants NSF-DMS-1008001, NSF-DMS-0708352 and NSF-DMS-1107379.

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Date submitted: 30 Jul 2014

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