Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

**Time-Reversal of Nonlinear Water Waves** AMIN CHABCHOUB, Department of Mechanical Engineering, School of Engineering, 02150 Espoo, Finland, GUILLAUME DUCROZET, LHEEA, cole Centrale Nantes, UMR CNRS No. 6598, 1 rue de la No, 44321 Nantes, France, MATHIAS FINK, Institut Langevin, ESPCI Paris, PSL University, CNRS, UMR CNRS No. 7587, 10 rue Vauquelin, 75005 Paris, France — Time-reversal (TR) refocusing of hydrodynamic nonlinear waves can be discussed within the framework of the nonlinear Schrödinger equation (NLS). Indeed, exact solutions of the latter weakly nonlinear evolution equation can be used to study the applicability and limitations of wave refocusing using TR mirrors in hydrodynamics. Recent laboratory experiments confirmed the applicability of TR approach to breathers, known to model extreme and doubly-localized wave configurations. In order to study the range of validity of the TR approach to nonlinear waves, a numerical study using a unidirectional numerical water wave tank, implemented by the higher-order spectral method, reveals new insights to the problem. The validity of the TR approach is assessed over a diversity of NLS configurations, ranging from stationary envelope and breathing solutions, pointing out the importance of higher-order dispersive and particularly nonlinear effects in the refocusing of these hydrodynamic localized structures. Due to the interdisciplinary nature of the approach several applications in other nonlinear dispersive physical media may result in addition to evident usage in the field of ocean engineering.

Amin Chabchoub
Department of Mechanical Engineering, School of Engineering, 02150 Espoo, Finland

Date submitted: 27 Sep 2016 Electronic form version 1.4