Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Dynamical properties of breaking waves: dissipation, air entrainment and spray generation NICK PIZZO, LUC DEIKE, W. KENDALL MELVILLE, Scripps Institution of Oceanography, UC San Diego, STEPHANIE POPINET, Sorbonne Universits, UPMC, CNRS, Institut Jean Le Rond dAlembert.
— Wave breaking in the ocean is of fundamental importance in order to quantify wave dissipation and air-sea interaction, including gas and momentum exchange, and to improve parametrization for ocean-atmosphere exchange in weather and climate models. Here, we present 2D and 3D direct numerical simulations of breaking waves, compared with laboratory measurements. The dissipation due to breaking in the 2D and 3D simulations is found to be in good agreement with experimental observations and inertial-scaling arguments [1,2]. We discuss the transition from a 2D to a 3D flow during breaking. We present a model for air entrainment and bubble statistics that describes well the experimental and numerical data, and is based on turbulent fragmentation of the bubbles and a balance between buoyancy forces and viscous dissipation [2]. Finally we discuss the generation of large drops during the impact and splashing process. [1] Deike, L., Popinet, S., and Melville, W.K. 2015. Journal of Fluid Mechanics. vol 769, p541-569.[2] Deike, L., Melville, W.K., and Popinet, S. 2016. Journal of Fluid Mechanics. vol 801, p91- 129.

Luc Deike
Scripps Institution of Oceanography, UC San Diego

Date submitted: 18 Oct 2016 Electronic form version 1.4