Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

An Experimental Study Comparing Droplet Production by a Strong Plunging and a Weak Spilling Breaking Water Waves[1] MARTIN ERININ, DAN WANG, DAVID TOWLE, XINAN LIU, JAMES DUNCAN, University of Maryland — In this study, the production of droplets by two mechanically generated breaking water waves is investigated in a wave tank. A strong plunging breaker and weak spilling breaker are generated repeatedly with a programmable wave maker by using two dispersively focused wave packets with the same wave maker motion profile shape (average frequency 1.15 Hz) and two overall amplitude factors. The profile histories of the breaking wave crests along the center plane of the tank are measured using cinematic laser-induced fluorescence. The droplets are measured using a high speed (650 Hz) cinematic digital in-line holographic system positioned at various locations along a horizontal plane that is 1 cm above the maximum wave crest height. The measurement plane covers the entire region in the tank where the wave breaks. The holographic system is used to obtain the droplet diameters (d, for d >100 microns) and the three components of the droplet velocities. From these measurements and counting only the droplets that are moving up, the spatio-temporal distribution of droplet generation by the two breaking waves is obtained. The main features of the droplet generation are correlated with the features and phases of the breaking process.

[1]The support of the National Science Foundation under grant OCE0751853 from the Division of Ocean Sciences is gratefully acknowledged.

Martin Erinin
Univ of Maryland-College Park

Date submitted: 31 Jul 2017 Electronic form version 1.4