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An Experimental Study of Droplet Generation by Plunging Breaking Water Waves[1] MARTIN A. ERININ, SOPHIE WANG, REN LIU, DAVID TOWLE, XINAN LIU, JAMES H. DUNCAN, University of Maryland — The production of droplets by strong, moderate, and weak plunging breakers is studied experimentally in a laboratory. The water waves are generated mechanically using a dispersively focused wave packet technique with an average wave packet frequency of 1.15 Hz for all three waves. Surface profile histories of the breaking wave crests are measured using a cinematic laser-induced fluorescence technique. The temporal evolution of the phase averaged surface profile of the breaker, obtained from 10 runs for each wave, are used to characterize the breakers. Droplets are measured using a cinematic digital in-line holographic system positioned at 28 streamwise locations along a horizontal plane (herein called the measurement plane) that is 1 cm above the maximum wave crest height. The droplet radii ($r \geq 100$ μm), positions and trajectories are determined from the holograms. Counting only the droplets that are moving up across the measurement plane, the spatio-temporal distribution of droplet generation by the breakers is obtained. Droplet statistics including total number, mean diameter and speed are presented. The relative importance of the various droplet generation mechanisms in the three waves are discussed and correlated with the mean wave profile characteristics.

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