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The Dynamics of Plunging Breakers and the Generation of Spray Droplets[1] MARTIN ERININ, SOPHIE WANG, BENJAMIN SCHAEFER, XINAN LIU, JAMES DUNCAN, University of Maryland, College Park — The breaking dynamics and spray generation by plunging breaking waves is studied in laboratory-scale experiments. Weak, moderate, and strong plunging breakers are mechanically generated using a dispersively focused wave packet technique. The spatio-temporal evolution of the breaker profile is measured at the center plane of the tank using a laser-induced fluorescence technique capturing ten realizations for each of the three breakers and covering a measurement region one wavelength. Phase averaged mean breaker profiles are computed and are used to characterize the three breakers based on geometric features like the jet impact speed and spatio-temporal distribution of surface roughness. Mean breaker features are found to be highly repeatable throughout the non-linear breaking process. Droplet positions, velocities, and radii ($d \geq 100$ μm) are measured for the same three breakers using a cinematic digital in-line holographic system positioned at many streamwise measurement positions located 1 cm above the maximum wave crest height. Droplet generation mechanisms are correlated to mean breaker characteristics.

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