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The Effects of Wind and Surfactants on Mechanically Generated Spilling Breakers[1] X. LIU, J.D. DIORIO, J.H. DUNCAN, University of Maryland — The effects of both wind and surfactants on mechanically generated weakly spilling breakers are explored in a wind wave tank that is 11.8 m long, 1.15 m wide and 1.8 m high (1.0 m of water). A wave maker, which resides at the upwind end of the tank, is used to generate the breakers via a dispersive focusing method with a central wave packet frequency of 1.15 Hz. Low wind speeds (less than 3.0 m/s) are used to minimize the effect of short-wavelength wind-generated waves on the breakers. The profiles of the spilling breakers along the center plane of the tank are measured with an LIF technique that utilizes a high-speed digital movie camera. Measurements are performed with clean water and water mixed with various concentrations of Triton X-100, a soluble surfactant. It is found that the capillary waves/bulge patterns found in the initial stages of spilling breakers are dramatically affected by wind and surfactants. The size of bulge increases with the wind speed while the capillary waves are kept nearly the same. In the presence of surfactants and wind, both the amplitude and number of capillary waves are reduced and the slope of the front face of the wave increases.

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