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The Combined Effects of Light-wind and Surfactants on Spilling Breakers[1] J.H. DUNCAN, X. LIU, D. WANG, University of Maryland — Spilling breaking waves in the presence of light-winds and surfactants were studied experimentally in a wind-wave tank. The breaking waves were mechanically generated with a single wave maker motion that produces a weak spilling breaker in clean water without wind. Separate experiments were performed with the same wave maker motion and very low wind speeds in clean water and in water with various concentrations of Triton X-100 (a soluble surfactant). The crest-profiles of the waves along the center plane of the tank were measured with a cinematic laser-induced fluorescence technique. In clean water with a wind speed lower than 2.3 m/s (the minimum wind speed of wind-generated waves in our tank), the wave breaking is initiated with a bulge-capillary-ripple pattern. When the wind speed is above 2.3 m/s, wind waves are generated. These wind waves steepen on the front face of the crest of the mechanically generated waves and trigger breaking of these larger scale waves. In the presence of surfactants, the bulge-capillary-ripple pattern occurs at even higher wind speeds (3 m/s). Geometrical parameters describing the wave crest shape were found to scale with the wind speed to the third power.

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