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On the Shape of the Crest of Short Wavelength Water Waves at Incipient Breaking[1] J.D. DIORIO, X. LIU, J.H. DUNCAN, University of Maryland — Breaking waves with wavelengths ranging from about 0.1 to 1.2 m are studied experimentally 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). The tank includes a wind tunnel with speeds up to 10 m/s and a programmable wave maker that resides at the upwind end of the tank. The shortest waves are generated by wind with speeds ranging from about 4 to 7 m/s. The longest waves are generated mechanically from focused wave packets with average frequencies ranging from 1.15 to 1.42 Hz. Waves with intermediate lengths are formed either by wind or by a nonlinear wave train with unstable sidebands generated by the wave maker. At incipient breaking, all the waves have a capillary-ripple pattern at the crest rather than a plunging jet. It is found that in spite of the wide range of wavelengths and major differences in the generation methods, the shapes of the capillary-ripple pattern are remarkably similar. Various geometrical parameters including the length of the first capillary wave and the length and thickness of the bulge that forms at the crest are extracted from the data. The variation of these parameters with gravity wavelength and slope of the front face of the wave is examined.

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