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On the unsteady free surface wave pattern found behind a localized pressure distribution moving at speeds just below the minimum phase speed of linear gravity capillary waves[1] N. MASNADI, J.H. DUNCAN, University of Maryland — The non-linear response of a water free surface to a localized pressure distribution moving at constant speed just below the minimum phase speed ($C_{min} \approx 23$ cm/s) of gravity-capillary waves is studied experimentally in a long tank. The pressure distribution is generated by blowing air onto the water surface via a vertically oriented 2-mm-ID tube that is mounted on an instrument carriage that is in turn set to move along the tank at constant speeds between 20 and 23 cm/s. A cinematic light refraction method is used to obtain quantitative measurements of the surface deformation pattern behind the air jet. At towing speeds just below C_{min}, an unsteady V-shaped wave pattern appears behind the pressure source. From observations of the wave pattern evolution, it is found that localized depressions are generated near the pressure source and propagate in pairs along the two arms of the V-shaped pattern. These are eventually shed from the tips of the pattern and rapidly decay. Measurements of the evolution of the speed of these localized depression patterns are compared to existing measurements of the speeds of steady three-dimensional solitary gravity-capillary waves (lumps) that appear behind the pressure source at even lower towing speeds.

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