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Air bubble Entrainment by Breaking Waves[1] M. TAVAKOLINEJAD, M. SHAKERI, J.H. DUNCAN, Department of Mechanical Engineering, University of Maryland — Air entrainment induced by plunging breaking bow waves simulated by a 2D+T wave maker was studied experimentally in a tank that is 14.8 m long, 1.15 m wide, and 2.2 m deep with a water depth of 1.85 m. In the 2D+T simulation, the sequence of shapes of the flexible surface (wave board) of the wave maker reproduces the time varying intersection of one side of the ship hull with a vertical plane oriented normal to the ship's track as the ship moves at constant speed. The experiments were performed in simulated seawater and the bubble sizes and velocities in the streamwise plane were measured with a double-pulsed shadowgraph method. Two equivalent ship model forward speeds, one with a very weak plunging breaker and one with a very strong plunging breaker, were studied. In the weak plunging breaker, a fairly uniform layer of bubbles is formed along the water surface. In the strong plunging breaker, many of the bubbles are found in two vortical regions: one from the air entrapped in the wave crest by the impact of the wave's plunging jet and one entrapped by the splash resulting from the jet impact. Bubble size distributions and bubble velocity distributions at times corresponding to the passage of the ship stern will be presented.

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