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Surfactant effects on cumulative drop size distributions produced by air bubbles bursting on a non-quiescent free surface[1] K. PARMAR, X. LIU, J.H. DUNCAN, University of Maryland — The generation of droplets when air bubbles travel upwards from within a liquid and burst at a free surface is studied experimentally. The bubbles are generated in a glass water tank that is 0.91 m long and 0.46 m wide with a water depth of 0.5 m. The tank is equipped with an acrylic box at its bottom that creates the bubble field using filtered air injected through an array of 180 hypodermic needles (0.33 mm ID). Two different surface conditions are created by using clean water and a 0.4% aqueous solution of Triton X-100 surfactant. Measurements of the bubble diameters as they approach the free surface are obtained with diffuse light shadowgraph images. The range of bubble diameters studied is 2.885 mm to 3.301 mm for clean water and 2.369 mm to 3.014 mm for the surfactant solution. A laser-light high-speed cinematic shadowgraph system is employed to record and measure the diameters and motions of the droplets at the free surface. This system can measure droplets with diameters ≤ 50 μm. The results show a clear distinction between the droplet distributions obtained in clean water and the surfactant solution. A bimodal droplet distribution is observed for clean water with at least two dominating peaks. For the surfactant solution, a single distribution peak is seen.

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James Duncan
University of Maryland

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