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Droplet impact on a liquid pool and bubble entrainment for low Bond numbers PASCAL SLEUTEL, University of Twente, PEI HSUN TSAI, National Taiwan University, WILCO BOUWHUIS, MARIE-JEAN THORAVAL, CLAAS-WILLEM VISSER, University of Twente, AN-BANG WANG, National Taiwan University, MICHEL VERSLUIS, DETLEF LOHSE, University of Twente —
Droplets impacting on a pool of liquid and the subsequent bubble entrainment has been well studied for high Bond numbers where the droplets size is large and velocities are low. Here we study for the first time the droplet impact and bubble entrainment in an entirely new parameter regime (Bo $\sim 10^{-2} - 10^{-3}$, U $\sim$ 6-20 m/s, D $\sim$ 0.08-0.4 mm). We follow up on the pioneering work of Oguz & Prosperetti, now in the surface tension dominated regime. We predict the bubble entrainment zone by balancing movement of the cavity bottom and droplet inertia with capillary waves enclosing the bubble. Both high-speed imaging experiments and numerical simulations in Gerris validate the model and show the importance of air for smaller droplet sizes.

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