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Dynamics of air bubbles passing through a liquid-liquid interface ROMAIN BONHOMME, Institut de Radioprotection et de Surete Nucleaire, JACQUES MAGNAUDET, Institut de Mecanique des Fluides de Toulouse, BRUNO PIAR, Institut de Radioprotection et de Surete Nucleaire, INTERFACE TEAM, DPAM/SEMIC/LIMSI TEAM — The passage of rising air bubbles through an initially flat horizontal liquid-liquid interface is studied using both laboratory experiments and Direct Numerical Simulation. The dynamics of spheroidal, spherical cap and toroidal bubbles near the liquid-liquid interface and subsequently through the upper liquid are investigated by coupling high-speed shadowgraph visualizations and Particle Image Velocimetry techniques. Axisymmetric computations are also carried out to assess the validity of presently available computational approaches in three-phase flows. These computations are based on two distinct approaches, namely a Volume Of Fluid approach without interface reconstruction and a Cahn-Hilliard model coupled with the incompressible Navier-Stokes equations. Experimental and computational results are compared in various configurations, including cases where the bubble is trapped at the liquid-liquid interface or rises in the upper phase while towing a column of the lower liquid that eventually breaks into droplets of various sizes.

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