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Dynamics of a rising bubble through the liquid-liquid interface RAGAVENDIRAN MUNIYAMMAL, ALAKESH CHANDRA MANDAL, SANJAY KUMAR, Indian Institute of Technology Kanpur — The dynamics of a bubble rising in stratified immiscible liquids through liquid-liquid interface is studied experimentally. High-speed imaging and time resolved Particle Image Velocimetry is used to investigate the bubble evolution with liquid-liquid interface. Bubble is released far from the interface to attain terminal condition before approaching the interface. The bubble rises through the lower fluid and then pierces through the interface to enter the upper fluid thereby deforming itself and liquid-liquid interface. Particularly, dependence of the shape and interface deformation, temporal velocity variation and wake dynamics of the bubble on bubble size and physical properties is examined. We identify critical Eötvös number = 5.34 and Galilei number = 0.89 where satellite pinch-off first occurring for high Morton number (= 245.08) lower fluid and characterize their pinch-off height. By varying the bubble size in the lower liquid, it is observed that, smaller size bubbles are trapped in the liquid-liquid interface as the bubble could not generate enough buoyancy to pierce the interface. It is also found that, film drainage of bubble with satellite pinch-off shows linear bubble velocity variation in transition whereas without pinch-off shows oscillating motion.

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