Abstract Submitted
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Bubble Pinch-off at High Pressures J.C. BURTON, P. TABOREK, University of California, Irvine — Previously we have studied the pinch-off of conventional air bubbles in water [1]. For inviscid fluids, the shrinking of the neck radius of the bubble can be described by a power-law in time with an exponent close to 1/2. As the density of the interior gas is increased, instabilities are expected to occur in the liquid/gas interface [2]. We present high-speed videos and numerical simulations of the pinch-off of high-pressure gaseous bubbles in and exterior inviscid fluid. The density ratio between the exterior fluid and interior gas is D=ρ_{ext}/ρ_{int}. In the simple case of small D$\sim$0.001, the pinch-off is similar to that of a water drop pinching-off in air, while at large D$\sim$1000, the pinch-off is that of an air bubble in water. By using sulfur hexafluoride as a working gas, we are able to span a wide ranging of density ratios simply by increasing the pressure of the gas. A high-pressure ($\sim$30 atm) chamber with optical access through sapphire windows was constructed in order to view the pinch-off. The numerical simulations are performed assuming perfectly inviscid fluids using boundary-integral techniques. Instabilities in the interface are seen for intermediate density ratios. Comparisons between experimental and numerical results will be discussed.
[1] J.C. Burton, R. Waldrep, and P. Taborek. Phys. Rev. Lett. 94, 184502, (2005).
[2] D. Leppinen and J.R. Lister. Phys. Fluids 15, 568, (2003).

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