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Re-entrant jet formation and shock emission in non-spherical bubble collapse[1] ERIC JOHNSEN, TIM COLONIUS, California Institute of Technology — The collapse of cavitation bubbles near a surface is a significant contributor to cavitation damage. In the present work, a high-order-accurate, quasi-conservative, interface- and shock-capturing scheme is used to simulate the collapse of a single air bubble numerically. The method allows non-spherical deformations of the interface (re-entrant jet formation) and shockwave generation and propagation. Axisymmetric Rayleigh collapse (RC) and shock-induced collapse (SIC) in a free-field and near a wall are considered in order to understand the non-spherical bubble dynamics and the sequence of emitted shockwaves; RC can be interpreted as SIC with infinite shock speed for a given pressure ratio across the interface/shock. The effects of baroclinic vorticity, acoustic radiation and interfacial instabilities are examined, and the pressure wave generated due to the impact of the jet upon the distal side is characterized. Preliminary observations show that the computed acoustic radiation is smaller for non-spherical collapse (RC near wall, free-field SIC).

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