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Oscillations of Large Bubbles Due to Sudden Finite Volume Release IDAN EIZENBERG, DAN LIBERZON, IAN JACOBI, Technion — The oscillatory behavior of large air bubbles produced from the instantaneous rupture of a submerged, finite volume container is characterized experimentally. Continuous gas release in the form of a unidirectional jet from underwater pipes or geophysical formations has received significant attention in the past, largely focused on the break-up of the gas stream and the size of the resulting bubbles. More recently, so-called 'glugging' behavior in constrained systems with very large reservoirs has also been studied, in which bi-directional mass exchange occurs between the liquid and gas phases. In contrast to both of these quasi-steady systems, the finite volume rupture problem depends significantly on the initial transient behavior of the two fluids, due to the bi-directional exchange in a relatively small, fixed, gas reservoir. The resulting gas release produces a similar bubble break-up behavior but with different time and length scales. We present time-resolved pressure and bubble geometry measurements following an instantaneous, underwater volume rupture, identify the relevant scaling behavior for the resulting dynamics, and contrast these measurements with less-constrained release systems.

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