Abstract Submitted
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Coalescence of Bubbles in a Newtonian Fluid CHRISTOPHER ANTHONY, SUMEET THETE, Purdue University, JAMES MUNRO, JOHN LISTER, University of Cambridge, MICHAEL HARRIS, OSMAN BASARAN, Purdue University — Bubble coalescence plays a central role in industry and nature. While considerable work has been done in the past decade to analyze the coalescence of drops in a passive outer fluid, it is only quite recently that the problem of bubble coalescence has begun to receive comparable interest. During bubble coalescence, two bubbles touch and create a gas bridge that grows from microscopic to macroscopic scales. We use high-accuracy simulation to analyze the dynamics in the vicinity of the space-time singularity created by the merging of two bubbles immersed in an outer Newtonian fluid of non-negligible density and viscosity while treating the inner gas as dynamically passive. This problem has recently been studied experimentally by Nagel and coworkers (2014) and theoretically by Munro and coworkers (2015) by asymptotic analysis. While both studies agree on power law scaling of the variation of the minimum neck radius with time, there is a discrepancy in the proposed/observed prefactors. In order to reconcile these differences, simulations are used to access earlier times than it has been possible in experiments. Extremely small length scales are also attained in the simulations through the use of a truncated domain approach.

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