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**Detailed Simulations of Bubble-Cluster Collapse Adjacent Material Surfaces** ARPIT TIWARI, CARLOS PANTANO, JONATHAN B. FREUND, University of Illinois at Urbana-Champaign — The collapse of bubble clusters adjacent material surfaces is thought to be an important damage mechanism, in both engineering and biomedical applications. Homogeneous models of these clusters have been able to reproduce some of their gross dynamics, however diagnostic challenges leave it unclear how important the bubble dynamics are for important quantities such as peak pressures on the surface. We study in detail the dynamics of small clusters collapsing adjacent to a wall using a numerical scheme that faithfully represents bubble-scale dynamics. It is based on a recently developed interface capturing method that is asymptotically consistent with a well-posed mixture model for the two phases. For collapse near a rigid wall, we show strong inward focusing of reentrant jets, which enhances the impulsive pressures generated on the wall. The homogeneous model we compare with fails to capture the true peak pressures on the walls. We further apply our scheme to simulate cluster collapse near a viscous fluid as a model for soft tissue, as in therapeutic ultrasound. In this case, the low impedance mismatch at the wall leads to significantly different dynamics. Simulations suggest that clusters can actually be relatively protective when compared to single-bubble collapses.

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