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Features of vorticity evolution in two- and three-dimensional simulations for shock-bubble interactions JOHN NIEDERHAUS, University of Wisconsin-Madison, JEFFREY GREENOUGH, Lawrence Livermore National Laboratory, JASON OAKLEY, RICCARDO BONAZZA, University of Wisconsin-Madison — Results are presented from a series of high-resolution Eulerian AMR simulations for planar shock wave interaction with a spherical gas bubble, which contrast the flowfield evolution under axisymmetry to the evolution when symmetry is relaxed and a small-amplitude, short-wavelength non-axisymmetric perturbation is imposed on the interface. For incident-shock Mach numbers $1.1<M<5$, the solution in two-dimensional axisymmetric (r-z) simulations differs significantly from that in three-dimensional non-axisymmetric simulations when the bubble gas density is greater than the ambient density such that the Atwood number is greater than 0.2. In that case, a vorticity field characterized by disordered motion arises in the mixing region in three-dimensional simulations, while vortex projectiles and interface shearing dominate in the two-dimensional simulations. In cases with Atwood number $A<0.2$, and in cases with bubble gas lighter than the ambient gas, stable vortices persist without significant development of disordered motion in both two-dimensional and three-dimensional simulations for $1.2<M<3.5$. This behavior is characterized here using integral diagnostics on the datasets, and physical mechanisms are proposed.

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