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Interaction of a planar shock wave with a spherical gas inhomogeneity. Part II: calculations. JOHN NIEDERHAUS, DEVESH RANJAN, MARK ANDERSON, JASON OAKLEY, RICCARDO BONAZZA — Results are presented from a series of 3-D simulations studying the compression and unstable growth of a spherical argon bubble accelerated by a planar shock wave of variable strength in a nitrogen environment. These include Mach numbers up to 3.38 and times up to 80 cloud-crushing times. Direct comparison is made between large- and small-scale flow features observed in experiments and obtained in simulations. Integral length scales of the mixing region are investigated, and their time evolution is characterized. Some of the properties of the turbulent velocity field are also investigated using the simulation results. The results indicate a high sensitivity of the calculations to the initial conditions and a significant difference in the post-shock time histories for shock Mach numbers smaller and larger than about 2, suggesting the importance of compressibility effects. These efforts are carried out in continuation of previous experimental and computational investigations performed at the University of Wisconsin Shock Tube Laboratory over the past two years.

Riccardo Bonazza
University of Wisconsin

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