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Interaction of a planar shock wave with a spherical gas inhomogeneity. Part I: experiments. DEVESH RANJAN, JOHN NIEDERHAUS, MARK ANDERSON, JASON OAKLEY, RICCARDO BONAZZA, University of Wisconsin — Experiments are performed in a vertical shock tube of square internal cross section to study the interaction of a planar shock wave with a spherical soap bubble. The argon-filled bubble is prepared at the tip of an injector and released to fall freely under the action of gravity inside the shock tube (filled with nitrogen) while the injector is retracted into the shock tube wall. Shock waves of strength in the range $1.3 \leq M \leq 3.4$ are used to accelerate the bubble. The bubble is initially compressed into a near-disk; a vortex ring then develops at the periphery of the bubble and leads to the entrainment of nitrogen into the argon and, in certain cases, to the development of a secondary vortex ring and an upward jet at the center of the ring. A high-speed digital motion picture of the free-falling bubble is recorded prior to the interaction with the shock wave, using front illumination with diffuse white light. Five post-shock images are recorded, four based on planar Mie scattering obtained illuminating the bubble with a laser sheet and one based on the shadowgraph technique. Numerical simulations of the experiments are performed using the *Raptor* code (LLNL) and the time evolution of the bubble height and width, measured from the experiments, is compared to the corresponding numerical predictions. Good agreement is obtained between experiments and calculations, especially at the earlier post-shock times.

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