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Three-dimensional modeling of Richtmyer-Meshkov instability[1]
MICHAEL ANDERSON, Illinoisrocstar LLC, PETER VOROBIEFF, C. RANDALL TRUMAN, The University of New Mexico, SANJAY KUMAR, University of Texas - Brownsville — We explore the use of CFD to accurately model the three-dimensional structure of Richtmyer-Meshkov instability (RMI), matching numerical data with new experimental results. Earlier experimental work focused on visualizing planar slices of the initial conditions to observe the formation and growth of the RMI. It was often assumed in the past that the initial conditions are relatively constant in the third dimension and any variation that existed had little effect on the resulting instabilities. Recent experiments have provided quantitative data revealing the three-dimensional structure of the flow. Two computational tools were used in this work, the commerical CFD code FLUENT and the Second-order Hydrodynamic Automatic Mesh Refinement Code (SHAMRC). To reproduce the experimental results, it was necessary to faithfully reproduce the initial conditions on a gaseous density interface prior to shock arrival. This was achieved with FLUENT. Then SHAMRC was used to model the shock interaction and subsequent formation of the RMI. Results are presented for 2D and 3D planar shock/heavy gas column interaction and explore the formation of structures observed experimentally.

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