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Modeling a Shock-Accelerated Fluid - Multiphase Fluid Interface
MICHAEL ANDERSON, PETER VOROBIEFF, ROSS WHITE, JOSEPH CONROY, C. RANDALL TRUMAN, The University of New Mexico, SANJAY KUMAR, University of Texas - Brownsville — The hydrocode SHAMRC has been used in the past to study the formation and growth of the Richtmyer-Meshkov Instability (RMI). While RMI involves impulsively accelerating two continuous fluids of differing densities, a similar class of instabilities has recently been described for multiphase flow. In this scenario, a shock wave passes through a region containing ambient air seeded with particles which have a non-trivial mass and density much greater than that of the surrounding and embedding fluid. In this scenario, no baroclinic vorticity is generated due to the lack of a fluid-fluid density interface. After the shock passage, the particles or droplets lag behind the surrounding gas. Momentum exchange between the embedded phase and the embedding phase leads to non-uniform local equilibrium velocity distribution, and thus to shear and vortex formation. As the primary mechanism for this instability formation is momentum transfer via drag, the morphology of the instability is strongly dependent of the sizes of the particles in the initial conditions. The simulations described here attempt to model the effects of changing the particle size on the morphology and growth rate of this instability.

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