Abstract Submitted
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Sensitivity of Shock Accelerated Multi-Component Compressible Flows[1] SANTHOSH SHANKAR, SANJIVA LELE, Stanford University — Numerical simulation of Richtmyer-Meshkov instability (RMI) is conducted using an improved localized artificial diffusivity (LAD) method which is used to treat discontinuities in the form of material-interfaces and shocks in the flow-field. The RMI occurs on a cylindrical interface between air and SF_6 accelerated by a Mach 1.2 shock initially in air. Navier-Stokes simulation is conducted to accurately predict the mixing between the two fluids. The initial conditions for the 2-D simulations are matched to previous experimental work by Tomkins et al (JFM 2008). Sensitivity of the mixing rate to mesh resolution is explored to arrive at grid converged results. The study on initial condition sensitivity indicates that the initial pressure and density gradient are critical parameters which determine the primary vortex generation responsible for the flow development. The effect of presence of the third species (acetone used as a tracer particle in the experiments to obtain contour fields using PLIF) is shown to be non-negligible and an estimate of the amount of the tracer species that was present in the initial experimental set-up is given.

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Santhosh Shankar
Stanford University

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