Abstract Submitted
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A Hybrid central difference/WENO scheme to simulate compressible turbulence with shocks and interfaces[1] ERIC JOHNSEN, JOHAN LARSSON, SANJIVA LELE, Stanford University — Numerical simulations of the late-time turbulent multi-material mixing in the Richtmyer-Meshkov instability (RMI) are challenging due to the contradictory requirements to treat turbulence, for which numerical dissipation must be avoided, and flow discontinuities, for which dissipation is introduced to stabilize the solution. In order to overcome this problem, a hybrid method was developed and is used to selectively apply a non-dissipative scheme in smooth regions, shock capturing at shocks, and interface capturing at interfaces. Results from 1D multicomponent Riemann problems and from 2D single-mode RMI will be presented and compared to other formulations to show that the present multifluid hybrid code does not generate spurious oscillations at discontinuities, that numerical dissipation is contained, and that the total mass, momentum and energy of the system are conserved. Detailed 3D simulations of the interaction of a shock in air with a curtain of SF6 will be presented, and the implementation of diffusive effects will be discussed.

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