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NUMERICAL STUDY OF RICHTMYER-MESHKOV INSTABILITY INDUCED-TURBULENT MIXING

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ABSTRACT

The hydrodynamic interfacial instability is an interest and important physical phenomena, and often occurs in many man-made applications and nature. In this report, we mainly numerically study the development of Richtmyer-Meshkov instability (light-heavy gas configuration) and its-induced turbulent mixing at long time by using our parallel LES code MVFT (multi-viscous-flow and turbulence). The width of turbulent mixing zone (TMZ) is growing following the power law but with different scaling factor after initial shock, re-shock and rarefaction wave shock respectively, then it will grow linearly after the sequent compression wave shock. The kinetic energy spectrum shows that, just after the incident shock-interface interaction, the initial perturbation modes still exist in the mixing zone; Afterwards, the initial perturbation modes disappear, and the energy spectrum moves towards the small wave numbers, explaining the larger and larger vortex structures develop in the turbulent mixing zone. We also have analyzed the effects of initial multi-mode perturbations on the development of TMZ, turbulent statistics and total amount of mixing.