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Numerical Simulation of Richtmyer-Meshkov Instability in Converging Geometries ZUOLI XIAO, JINXIN WU, College of Engineering, Peking University — A high-order turbulence solver in curvilinear coordinates is developed for numerical simulation of multi-species compressible flows with discontinuities, in which high-order compact finite difference schemes and localized artificial diffusivities are employed to satisfy the need for high accuracy and discontinuity capturing. The Richtmyer-Meshkov instability (RMI) induced mixing flows driven by imploding shock in both cylindrical and spherical geometries are numerically investigated using direct numerical simulation method. The detailed evolutions of RMI are compared with experimental data and theoretical results, and reasonably good consistency is observed both qualitatively and quantitatively before reshock. The vortex dynamics of RMI after shock impingement is also discussed, and the initially deposited circulation on the interface during shock-interface interaction is calculated from the simulation, which is in accordance with the results of theoretical prediction. Moreover, effects of the modes and amplitude of initial perturbations, as well as the incident shock Mach number on the interfacial growth rate are evaluated during the shock implosion and reflection from the center.

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