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Effect of initial perturbation amplitude on Richtmyer-Meshkov flows induced by strong shocks[1] ZACHARY DELL, Carnegie Mellon University, ROBERT STELLINGWERF, Stellingwerf Consulting, SNEZHANA ABARZHI, Carnegie Mellon University — We study the effect initial perturbation on the Richtmyer-Meshkov (RM) flows induced by strong shocks in fluids with contrasting densities. Smooth Particle Hydrodynamics simulations are employed. Broad range of shock strengths and density ratios is considered (Mach=3,5,10, and Atwood=0.6,0.8,0.95). The amplitude of initial single mode sinusoidal perturbation of the interface varies from 0% to 100% of its wavelength. We analyze the initial growth-rate of the RMI immediately after the shock passage, when the perturbation amplitude increases linearly with time. We find that the initial growth-rate of RMI is a non-monotone function of the amplitude of the initial perturbation. This restrains the amount of energy that can be deposited by the shock at the interface. The maximum value of the initial growth-rate depends strongly and the corresponding value of the initial perturbation amplitude depends only slightly on the shock strength and density ratio. The maximum value of the initial growth-rate increases with the increase of the Atwood number for a fixed Mach number, and decreases with the increase of the Mach number for a fixed Atwood number. We argue that the non-monotonicity of RMI growth-rate is a result of a combination of geometric effect and the effect of secondary shocks.

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