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Effect of initial amplitude on the interfacial and bulk dynamics in Richtmyer-Meshkov instability under conditions of high energy density[1] ZACHARY DELL, Carnegie Mellon University, ROBERT STELLINGWERF, Stellingwerf Consulting, SNEZHANA ABARZHI, Carnegie Mellon University — We systematically study the effect of the initial amplitude on the interfacial and bulk dynamics of the Richtmyer-Meshkov instability (RM) induced by strong shocks. The shock propagates from the light to the heavy fluid. The fluid densities are contrast. The fluid interface is initially perturbed with a cosine wave perturbation. Its amplitude is varied from 0% to 100% of the initial perturbation wavelength. A broad range of shock strengths and density ratios is considered. Smoothed particle hydrodynamics code is employed to ensure shock capturing and interface tracking. Detailed diagnostics of the flow scalar and vector fields is performed. Whenever possible the simulation results are compared with existing theoretical analyses achieving good agreement. The focus question of our study is how the energy deposited by the shock is partitioned between the interfacial and volumetric components. We analyze the dependence of the initial growth-rate of RMI, the velocity away from the interface, and the transmitted shock velocity as functions of the initial amplitude. Particularly, we found that for a Mach number 5 and an Atwood number 0.8, the initial growth rate is highest and the interfacial energy is the largest when the initial amplitude is about a quarter of the wavelength.

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