

Abstract Submitted
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A comparison study of planar Richtmyer-Meshkov instability in Mie-Grüneisen fluids and perfect gases¹ G.M. WARD, D.I. PULLIN, Caltech — A numerical study of planar Richtmyer-Meshkov instability in fluids with Mie-Grüneisen equations of state is presented and compared to similar perfect gas flows to expose the role of the equation of state. Results for single and triple-mode planar Richtmyer-Meshkov instability, when a reflected shock wave occurs, are first given for MORB and Molybdenum. Comparison is drawn to perfect gases with matched non-dimensional pressure jump across the incident shock, post shock Atwood ratio and post shock amplitude to wavelength ratio, which matches the Richtmyer constant linear growth-rate. Differences in start-up time and growth rate oscillations are demonstrated to correlate directly to the oscillation frequency for the transmitted and reflected shocks. Further results are given for single mode Richtmyer-Meshkov instability when a reflected expansion wave is present. Matched perfect gas solutions in such cases yield a higher degree of similarity in start-up time and growth rate oscillations. Additionally, for the reflected expansion case both equations of state are seen to yield incipient weak shock waves in the heavy fluid caused by perturbed-shock driven localized interface oscillations.

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Dale Pullin
Caltech

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