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Richtmyer-Meshkov flow of elastic-plastic solids using a high-order Eulerian framework NIRANJAN S. GHAISAS, Center for Turbulence Research, Stanford University, AKSHAY SUBRAMANIAM, Dept. of Aeronautics and Astronautics, Stanford University, SANJIVA K. LELE, Dept. of Aeronautics and Astronautics and Center for Turbulence Research, Stanford University — A high-order, fully Eulerian numerical framework is developed for tracking large, elastic-plastic deformations of solids coupled to fluids. Material interfaces are treated numerically using a diffuse-interface approximation. The numerical method is based on a 10^{th}order compact finite difference scheme for spatial discretization, a 4^{th}order Runge-Kutta time stepping method and a localized artificial diffusivity (LAD) method for regularizing shocks and material interfaces. This numerical framework was previously established for ideal gases and is extended in this study to liquids (stiffened gases) and solids. We establish the accuracy of our method by comparing to analytical results and demonstrate the superior resolution properties of our method by comparing to results of previous numerical studies that employed lower order methods. The effects of different equations of state and material stiffness parameters on the characteristics of the Richtmyer-Meshkov flow are investigated.

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