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Volume-of-Fluid Representation of Multifluid Compressible Hydrodynamics in the FLASH Code[1] ADAM REYES, PETROS TZEFERACOS, University of Rochester, JOHN GROVE, Los Alamos National Laboratory, EDWARD HANSEN, DAVID MICHTA, University of Rochester, KLAUS WEIDE, DON LAMB, University of Chicago — We present an implementation of the Volume-of-Fluid (VOF) method to model multiple immiscible compressible fluid species within FLASH. FLASH is a highly capable, parallel, adaptive mesh refinement, finite-volume Eulerian hydrodynamics and MHD code with extended physics capabilities. FLASH assumes a Dalton mix of the species within each computational cell, and advects the corresponding mass fractions with the flow, resulting in the mixing of species across contact discontinuities. In VOF species are assumed to occupy distinct volumes whose interfaces may cut the computational cells and are assumed to be in mechanical equilibrium with a single velocity field shared by all species. Special care needs to be taken to allow for the compressibility of the different species, but allows for the modelling of shocks and discontinuities in the flow, maintaining sharp interfaces between species even at contact discontinuities. We highlight the capabilities of this VOF implementation in FLASH for simple gamma law equations of state (EOS); the formulation is readily extended to tabulated EOS for simulations of high energy density physics and laser driven experiments.

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