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Implementation of WENO schemes in compressible multicomponent flow problems[1] ERIC JOHNSEN, TIM COLONIUS, California Institute of Technology — Shock-capturing schemes are capable of properly resolving discontinuities with correct wave speeds in single-fluid Riemann problems. However, when different fluids are present, oscillations develop at interfaces. A class of existing methods that suppress these oscillations is based on first- and second-order accurate reconstructions with Roe solvers. In this presentation, we extend these methods to high-order accurate Weighted Essentially Non-Oscillatory (WENO) schemes and Harten, Lax and van Leer (HLL) approximate Riemann solvers. In particular, we show that a finite volume scheme where the appropriately averaged primitive variables are reconstructed leads to oscillation-free solutions to multicomponent Riemann problems. We restrict our analysis to a stiffened equation of state, which can model interfaces in flows of gas and liquid components. Our method is high-order accurate, conservative, and positivity-preserving; these properties are verified by considering one-dimensional multicomponent Riemann problems and a two-dimensional shock-bubble interaction.

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