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Low-dissipation hybrid schemes for simulations of compressible multicomponent flows POOYA MOVAHED, ERIC JOHNSEN, University of Michigan, Ann Arbor — In the present work an efficient hybrid scheme is proposed for numerical simulations of compressible multicomponent flows. The algorithm is based on a high-order accurate weighted essentially non-oscillatory (WENO) scheme for shock capturing and a non-dissipative central scheme in the split form for smooth regions. The central-difference method results in a reasonable speed up and exhibits better resolution properties for turbulence. The shock capturing is handled using the AUSM+up Riemann solver with a WENO reconstruction of the primitive variables. A new sensor based on the first norm of the difference of WENO weights from the ideal weights is used at the beginning of each Runge-Kutta step for a smooth transition between the central and WENO fluxes at interfaces. The scheme is shown to prevent spurious pressure oscillations at interfaces. The performance of the method is presented for a set of problems including the Sod shock tube problem, the Shu-Osher problem and the planar Richtmyer-Meshkov instability with particular emphasis on mixing at early and late times. This research was supported in part by the DOE NNSA under the Predictive Science Academic Alliance Program by grant DEFC52- 08NA28616.

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