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Multicomponent Reynolds-Averaged Navier–Stokes Simulations of Reshocked Richtmyer–Meshkov Instability and Turbulent Mixing: Mach Number and Atwood Number Effects[1] TIBERIUS MORAN-LOPEZ, Department of Energy, National Nuclear Security Administration, OLEG SCHILLING, Lawrence Livermore National Laboratory — Reshocked Richtmyer–Meshkov turbulent mixing for various gas pairs and large shock Mach numbers is simulated using a third-order weighted essentially nonoscillatory (WENO) implementation of a new K–ϵ multicomponent Reynolds-averaged Navier–Stokes model. Experiments previously performed at the University of Provence with gas pairs CO_2/He, CO_2/Ar, and CO_2/Kr (with $At = -0.73$, -0.05, and 0.3, respectively) and incident shock Mach numbers $Ma = 2.4$, 3.1, 3.7, 4.2, and 4.5 are considered. The evolution of the mixing layer widths is shown to be in good agreement with the experimental data. Budgets of the turbulent transport equations are used to elucidate the mechanisms contributing to turbulent mixing in large Mach number reshocked Richtmyer–Meshkov instability. These results are contrasted with those from previous modeling of smaller Mach number experiments to identify the physical effects which require accurate modeling, including mean and turbulent enthalpy diffusion, pressure–dilatation, and dilatation dissipation.

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