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A Comparative Study of Two-, Three- and Four-Equation Multicomponent Reynolds-Averaged Navier-Stokes Model Predictions of Turbulent Mixing in Reshocked Richtmyer-Meshkov Instability[1] OLEG SCHILLING, Lawrence Livermore National Laboratory — A multicomponent implementation of two-, three- and four-equation Reynolds-averaged Navier-Stokes models using either the turbulent kinetic energy dissipation rate or lengthscale as the second mechanical turbulence quantity is applied to model a Mach 1.5 reshocked Richtmyer-Meshkov instability in the light-to-heavy and heavy-to-light cases. The model includes mixture molecular transport terms, enthalpy diffusion terms, pressure-dilatation and dilatation dissipation models, and a molecular diffusion flux with contributions from baro- and thermodiffusion. The four-equation models couple transport equations for the mass flux a_i and the negative density-specific volume correlation b to the K-ϵ or K-L equations, while the three-equation models use an algebraic closure for b. The evolution of various turbulence statistics, fields, and turbulent transport equation budgets are compared among these models to identify any differences in the turbulence production, dissipation and diffusion physics represented by the closures used in these models.

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