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Progress on Multicomponent Reynolds-Averaged Navier–Stokes Model Development and Validation for Rayleigh–Taylor and Reshocked Richtmyer–Meshkov Turbulent Mixing[1] OLEG SCHILLING, Lawrence Livermore National Laboratory — Recent progress on the development and validation of a new K–ϵ multicomponent Reynolds-averaged Navier–Stokes model is discussed. The model includes mixture molecular dissipation and diffusion terms, molecular and turbulent enthalpy diffusion terms, and models for pressure–dilatation and dilatation dissipation. The model has successfully been applied to a set of ten reshocked Richtmyer–Meshkov mixing experiments, and more recently to experiments with larger Mach numbers and various Atwood numbers. An extension of the model to include a modeled density variance transport equation is described. The three-equation model is applied to various Rayleigh–Taylor mixing cases with complex accelerations. The evolution of various turbulence statistics, fields, and turbulent transport equation budgets are compared among these cases to elucidate differences in the turbulence production, dissipation and diffusion mechanisms. It is also shown that the mechanical turbulence timescale is poorly correlated with the molecular mixing timescale determined by the time-evolution of the molecular mixing parameter.

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