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Reynolds–Averaged Navier–Stokes Modeling of Large Reynolds Number Mechanical and Scalar Rayleigh–Taylor Turbulent Mixing[1] GREGORY BURTON, OLEG SCHILLING, Lawrence Livermore National Laboratory — A three- and four-equation, variable-density, incompressible Reynolds-averaged Navier–Stokes model incorporating mechanical and scalar turbulence is used to simulate Rayleigh–Taylor turbulent mixing with an Atwood number equal to one-half. Using both Reynolds number-dependent (optimal) and constant late-time model coefficients obtained by minimizing the L^2 norm between the model and the large Reynolds number 3072^3 Cabot–Cook direct numerical simulation data, the predicted mixing layer evolution is compared with the averaged DNS data in a posteriori tests. The terms in the transport equation budgets are compared in detail to their profiles across the mixing layer predicted by the DNS. The capability of the model to predict the degree of molecular mixing is also assessed.

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