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A Buoyancy–Shear–Drag-Based Turbulence Model for Rayleigh–Taylor, Reshocked Richtmyer–Meshkov, and Kelvin–Helmholtz Mixing[1]
OLEG SCHILLING, Lawrence Livermore National Laboratory — A phenomenological turbulence model for Rayleigh–Taylor, reshocked Richtmyer–Meshkov, and Kelvin–Helmholtz instability-induced mixing is developed using a general buoyancysheardrag model. Analytical solutions are used to calibrate the coefficients to predict specific values of the mixing growth parameters and exponents. The model is applied to the three instability cases to demonstrate its utility. It is shown that the numerical solutions of the model calibrated using specific values of the instability growth parameters and exponents: (1) produces mixing layer widths in agreement with the expected self-similar growth power laws; (2) gives spatiotemporal profiles of turbulent fields that are expected and consistent with previous results; (3) predicts the expected power-law growths and decays of the spatially-integrated turbulent fields, and; (4) gives spatiotemporal profiles of the mean fields that are expected and consistent with previous results.

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