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Modeling Turbulent Mixing[1] BAOLIAN CHENG, Los Alamos National Laboratory, JAMES GLIMM, Department of Applied Mathematics and Statistics, University at Stony Brook, DAVID SHARP, Los Alamos National Laboratory — Fluid mixing is an important phenomenon in many physical applications from supernova explosions to genetic structure formations. Moving interfaces between distinct fluids in a multi-fluid system are often unstable. Small perturbations at such interfaces grow as a result of nonlinear hydrodynamic processes, and evolve into turbulent mixing regions. Three major types of hydrodynamic instability play an important role in mix processes: (1) the Rayleigh-Taylor instability, occurring when a fluid pushes another fluid of higher density; (2) the Richtmyer-Meshkov instability, which takes place when a shock wave accelerates a perturbed interface between two fluids of different densities; and (3) the Kelvin-Helmholtz instability, which arises when a nonzero velocity discontinuity exists between the two fluids. In this work, we present theoretical models to predict the mixing growth rates and numerical simulations for the chaotic mixing fluids. Our results are in good agreement with experiments.

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