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Understanding the Rayleigh-Taylor instability through 1D and 3D simulations MARK MIKHAEIL, Georgia Institute of Technology, NICHOLAS DENISSEN, Los Alamos National Laboratory, DEVESH RANJAN, Georgia Institute of Technology — A series of Rayleigh-Taylor instability numerical simulations were completed using the Arbitrary Lagrangian-Eulerian hydrocode FLAG developed at Los Alamos National Laboratory. One-dimensional simulations employed a Reynolds-averaged Navier-Stokes approach with turbulence closure models selected from the Besnard-Harlow-Rauenzahn family of models. Growth rate parameters and turbulence statistics are derived from these simulations and compared between closure models. Variations from experimental results are explored and used to validate the models. The effect of density ratio on the bubble-spike growth rate asymmetry is also investigated. High resolution three-dimensional large eddy simulations (LES) are also completed and presented. LES were initialized using a multi-modal perturbation prescribed from experimental data collected at the Georgia Institute of Technology multi-layer Gas Tunnel facility. Turbulence statistics are gathered by averaging many simulations started with different initial conditions. Late time development is compared to Gas Tunnel experimental results and previous LES.

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