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Exploring Rayleigh-Taylor Initial Conditions Using a New LES Moment Closure DANIEL ISRAEL, Los Alamos National Laboratory — The effects of initial conditions on the initial transient and long-time development of self-similarity in a Rayleigh-Taylor mixing layer are explored using a new, moment-closure based, large-eddy simulation (LES). The model is derived using moment closure techniques analogous to those developed for Reynolds-averaged Navier Stokes (RANS) of variable density turbulence. Instead of using a scaling equation to obtain a RANS length scale, an LES filter width is chosen just small enough to resolve the large turbulence structures. This model can reproduce the evolution of the large turbulent structures, with good results in both two and three-dimensional simulations. In this presentation, results using the new LES model are compared to DNS predictions as well as theoretical scaling laws. Two regimes are examined: first, the initial transient and approach to self-similarity, and second, the late-time quadratic growth. The interplay of the initial conditions for the resolved and modeled fields is also examined. Finally, some conclusions are made regarding the initial condition problem, as well as the suitability of the new closure approach for this type of investigation.

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