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RANS Simulations of the Tilted Rig Experiment:A Two-dimensional Rayleigh-Taylor Instability Case NICHOLAS DENISSEN, BERTRAN ROLLIN, JON REISNER, MALCOLM ANDREWS, Los Alamos National Laboratory — Modeling turbulent mixing due to unstable density stratification is of fundamental interest in many multiphysics applications. RANS models remain the tool of choice for efficient estimates of the effects of turbulence on complex problems. While many RANS models have been validated for canonical Rayleigh–Taylor turbulence, applications of interest often have non-planar/dynamic interfaces. This presentation will address the ability of a multispecies, compressible, turbulence model to compute RT mixing on a moving interface. The simulations are based on the tilted rocket-rig experiments designed to study mixing of fluids by the Rayleigh-Taylor instability. In this experiment, a tank containing two fluids of different densities is accelerated downward with the rig inclined by a few degrees off vertical. The RANS simulations are be compared to experiments, direct numerical simulations and large eddy simulations to analyze the model's ability to capture 2D flow features.

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