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RANS Simulations of Rocket Rig Experiments: Capturing the Effects of the Rayleigh- Taylor Instability Subject to a Changing Body Force REBECCA BERTSCH, ROBERT GORE, Los Alamos National Laboratory — Modeling turbulent mixing in variable density (VD) fluid flows is a key topic of interest in multi-physics applications due to the complex instability characteristics they exhibit. RANS models continue to be accurate and efficient tools to investigate the evolution of turbulence in these complex flow problems. Many RANS models are well validated for prototypical variable density flows such as Rayleigh-Taylor (RT) and Richtmeyer-Meshkov (RM). However, most lack the ability to accurately capture mix features in VD flows with changing body forces, like those seen in rocket rig experiments that undergo phases of acceleration and deceleration. This talk will present some simulations of an improved RANS model which substitutes the molecular diffusion term in the species equation with a demix term that is dependent on the turbulent mass flux and species micro-densities. Results from these simulations will be compared with previous RANS models, DNS, and experimental data to validate the new models ability to capture the mixing physics in RT flow subject to a changing body force.

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