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Observations of Variable-Density Turbulence From a Complex Fluid Interface[1] DAVID REILLY, JOHN CARTER, MOHAMMAD MOHAGHAR, DORRIN JARRAHBASHI, Georgia Institute of Technology, JACOB MCFARLAND, University of Missouri, DEVESH RANJAN, Georgia Institute of Technology — The inclined shock tube facility in the Georgia Tech Shock Tube and Advanced Mixing Laboratory was used to study a complex inclined interface initial condition for the Richtmyer-Meshkov instability. The inclined interface is essentially a long wavelength, extremely large amplitude perturbation between two gases. In this case, the light gas was chosen to be nitrogen and the heavy gas carbon dioxide, giving an Atwood number of 0.23. The complex interface is formed by perturbing the inclined interface with counter-flowing jets, which create shear and buoyancy effects. The modal content of the initial conditions was determined by taking the Proper Orthogonal Decomposition of a large set of realizations. PLIF images of the shocked flow-field ($M \sim 1.5$) were captured with the angle of the shock tube with respect to the horizontal at 80°. Enhanced mixing in the complex interface was quantified through p.d.f.s, mixed mass, and the density self-correlation. Work that is currently underway will investigate the effect of these initial conditions on intermediate and late-time mixing as well as the transition to turbulence before reshock by implementing simultaneous PLIF and PIV measurements.

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