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DNS of Turbulent Mixing Layers Between Two Fluids of Large Density Difference JON BALTZER, DANIEL LIVESCU, Los Alamos National Laboratory — In numerous practical applications, shear layers exist between fluids of strongly differing densities. At high Atwood numbers, the large variations in density introduce important effects that have recently been observed in other flows (e.g., Livescu & Ristorcelli, J. Fluid Mech., **605**, 145-180, 2008). To investigate the inertial variable density effects on the instability growth and structure of mixing layers, we first omit the buoyancy effects and perform very large Direct Numerical Simulations of planar mixing layers between two miscible fluids, each with different density. We consider initial disturbances for the DNS in light of linear stability analysis using a new, generalized form of the Orr-Sommerfeld equations, which includes the variable density effects. Based on the most unstable modes obtained from this analysis, DNS domain sizes are varied to accommodate different extents of mode pairing. The results display the overall statistical effects on the turbulence and mixing, as well as the structural differences, that occur as Atwood number is varied. In particular, the asymmetries introduced by the differences in the densities of the mixing layer streams are highlighted.

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