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Mixing Characteristics in Buoyancy-Driven, Variable Density Turbulence DANIEL LIVESCU, RAY RISTORCELLI, Los Alamos National Laboratory — The mixing between two incompressible fluids with different densities in an unstable stratified configuration, as occurs in the Rayleigh-Taylor instability, is examined using Direct Numerical Simulations. The statistically homogeneous case is considered as a unit problem for variable density turbulence. It involves both the transition to turbulence and the decay of turbulence as the friction forces overcome buoyancy generation. No Boussinesq approximation is made so that high Atwood numbers are allowed. The two fluids are initially non-premixed with a double-delta PDF and the flow is dominated at early times by transport mixing rather than diffusion. At early times buoyancy production is important at all scales leading to anisotropy at all scales. Later, only the large scales remain anisotropic. Numerical results are used to examine the morphology of the scalar structures and the influence of various parameters on the mixing progress.

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