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Buoyancy-driven variable density turbulence DANIEL LIVESCU,
J.R. RISTORCELLI, Los Alamos National Laboratory — Buoyancy generated motions in an unstably stratified field composed of two incompressible miscible fluids with different densities, as occurs in the Rayleigh-Taylor instability, are examined. The statistically homogeneous case is considered as a unit problem for variable density turbulence and no Boussinesq approximation is made so that high Atwood numbers are allowed. The flow starts with zero solenoidal velocity in a non-premixed state and turbulence is generated due to the baroclinic production of vorticity and eventually dies as the two fluids become molecularly mixed. Results from Direct Numerical Simulations are used to follow the turbulence birth-life-death process and examine the influence of various parameters, Atwood, Reynolds and Schmidt numbers, and initial length scale of the density field on the mixing.

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