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Erosion of a Sharp Density Interface by Homogeneous Isotropic Turbulence BLAIR JOHNSON, JOEL LAGADE, JR., University of Texas at Austin — An experimental study is performed to quantify mixing across a stably stratified density interface subject to turbulence in the absence of mean shear. Driven by a spatio-temporally varying array of 256 synthetic jets suspended above a water tank, high Reynolds number (Re_λ ~300) horizontally homogeneous isotropic turbulence is generated with negligible mean flow. A dense layer comprised of a mixture of sugar, Rhodamine B dye, and water is initially stationary at the base of the tank. Simultaneous particle image velocimetry (PIV) and laser-induced fluorescence (LIF) measurements are used to characterize the near-interface flow velocity structures and density evolution, respectively. From PIV data, statistical metrics such as turbulence intensities, turbulent kinetic energy, spectra, dissipation, and integral length scales can be found. Using LIF data, entrainment is quantified based on techniques presented in Zhou et al. (2017), in which an effective turbulent diffusivity is calculated directly from instantaneous spatial buoyancy gradients. This study presents preliminary results of the dependence of mixing on imposed turbulence levels, initial density gradient, and depth of the dense layer, to determine under what conditions erosion, sharpening, and mixing of the layers occurs.

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