Abstract Submitted
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Transition to turbulence in stratified shear flow: experiments in an inclined square duct[1] COLIN MEYER, PAUL LINDEN, University of Cambridge — We describe laboratory experiments of countercurrent stratified shear flow in an inclined square duct. To achieve this, a long water tank was partitioned into regions of higher and lower density saltwater that are connected by an inclined square duct. The flow regime was characterized to be turbulent, intermittent, Holmboe or laminar as a function of the duct inclination, θ, and the density difference, $\Delta\rho$, between the two reservoirs. The density difference and duct angle were systematically varied and a phase plane of flow regime was developed. The transition between the interrmittent regime and turbulence was experimentally determined to occur at $\theta\Delta\rho \simeq 20$ [degrees kg m^{-3}]. This critical combination of parameters fits into the buoyancy-compensated Reynolds number scaling proposed by Brethouwer et al. (*J. Fluid Mech.*, 2007). The turbulent interfacial thickness was found to be a function of the inclination angle, which can be predicted using the buoyancy lengthscale from Waite and Bartello (*J. Fluid Mech.*, 2004) and others. Furthermore, we measured the density profiles at multiple points along the duct, and using these profiles, we modeled the entrainment at the interface.

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