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Buoyancy-induced turbulent mixing in a narrow tilted tank TIRAS Y. LIN, BP Institute & Earth Sciences, University of Cambridge, C.P. CAULFIELD, BP Institute & DAMTP, University of Cambridge, ANDREW W. WOODS, BP Institute, University of Cambridge — We describe a series of experiments in which a constant buoyancy flux B_s of dyed salty water of density ρ_s is introduced at the top of a long narrow tank of square cross-section tilted at an angle θ from the vertical. The tank is initially filled with fresh clear water of density $\rho_0 < \rho_s$, and we investigate the resulting buoyancy-driven high Reynolds number turbulent mixing at various tilt angles θ using a light-attenuation method. When $\theta > 0°$, the ensemble averaged reduced gravity develops a statically stable gradient normal to the walls of the tank, and this induces a counterflow. We model the evolution of the cross-tank and ensemble averaged reduced gravity $\left\langle \overline{g'} \right\rangle_e$ as a diffusive process using Prandtl's mixing length theory, building on the model of van Sommeren *et al.* (*JFM* **701**, 2012) who considered vertical tanks. We show that the counterflow acts to enhance the effective along-tank turbulent diffusivity, and from experiments, we find that the mixing length increases approximately linearly with θ, and that both the along-tank and cross-tank turbulent diffusivities are proportional to $\left(\partial \left\langle \overline{g'} \right\rangle_e / \partial z\right)^{1/2}$.

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