Abstract Submitted
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Quantifying mixing in stratified plane Couette flows in a tracer-based coordinate[1] QI ZHOU, JOHN TAYLOR, DAMTP, University of Cambridge, COLM-CILLE CAULFIELD, BP Institute and DAMTP, University of Cambridge, PAUL LINDEN, DAMTP, University of Cambridge — The mixing properties of statically stable density interfaces subject to imposed vertical shear are investigated using direct numerical simulations. At the start of each simulation, a sharp density interface is introduced at the mid-plane between two flat, counter-moving horizontal walls. Particular attention is paid to the effects of varying Prandtl number over two orders of magnitude from 0.7, 7 to 70. The dynamics of the interface varies from shear-induced overturning at small Richardson numbers to internal waves at large Richardson numbers. At sufficiently large Peclet number, the dynamics allows the density interface to remain sharp. This is due to the combined effects of the 'scouring' induced by the turbulence external to the interface and comparatively weak molecular diffusion across the core region of the interface. The effective diapycnal diffusivity and irreversible density flux are quantified in the tracer-based coordinate proposed by Winters and D'Asaro (*J. Fluid Mech.*, 317, 1996) and Nakamura (*J. Atmos. Sci.*, 53, 1996). We further discuss the dependence of the effective diffusivity on the characteristic parameters of the flow, and the implications for mixing efficiency and layer formation.

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