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Flux variation and layering in turbulent stratified Taylor-Couette flow ROSALIND OGLETHORPE, DAMTP, U. of Cambridge, C.P. CAULFIELD, BP Institute & DAMTP, U. of Cambridge, ANDREW W. WOODS, BP Institute, U. of Cambridge — We present new experimental measurements of turbulent mixing in stratified Taylor-Couette flow. We vary the inner radius and rotation rate, and consider both two layer and initially linear stable stratification. With a two layer stratification, we demonstrate that the flux of salt through the interface is a non-monotonic function of a Richardson number $Ri = g\Delta\rho D/(\rho_0 u^2)$, where D and u are characteristic length and velocity scales of the turbulent flow. As predicted by Phillips (1972)*DSR* **19**, this behaviour implies that a linear stratification will spontaneously form layers of relatively well mixed fluid separated by relatively thin interfaces. We demonstrate the spontaneous development of such layers in experiments where the stratification is initially linear with constant buoyancy frequency N. The depth of these layers $h_L \propto U_H/N$, where U_H is a horizontal velocity scale, and the flux through these layers is independent of h_L. In particular we demonstrate, consistently with Woods *et al.* (2010)*JFM* **663**, who considered the strongly stratified limit in two layer flow, that the salt flux tends to an asymptotic constant value when the flow is strongly stratified, even when multiple layers are present.

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