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Mixing of a stable linear density stratification in Taylor-Couette flow R.L.F. OGLETHORPE, C.P. CAULFIELD, BPI & DAMTP, University of Cambridge, ANDREW W. WOODS, BPI, University of Cambridge — We consider mixing of an initially linear stable salt stratification in turbulent Taylor-Couette flow. The fluid is confined to a cylindrical annulus with a vertical axis. Mixing is caused by rotating the inner cylinder at a constant rate. The outer cylinder is fixed. Experimental measurements show that at high initial bulk Richardson number, defined as $Ri_0 = N^2/\Omega^2$, where N is the buoyancy frequency of the initial stratification and Ω is the rotation rate of the inner cylinder, an initially linear salt stratification develops a series of well mixed layers separated by sharp interfaces. The size of these layers appears to depend on Ri_0 and the gap width between the cylinders, Δ_R. With time, the layers at the top and bottom of the tank evolve in salinity. This leads to entrainment from and eventual mixing with the adjacent layers as the salinity contrast across these interfaces decreases. As a result of successive merger events, eventually the system becomes well mixed. The salinity of the inner layers appears to remain constant, so that salt is transported from the bottom layer to the top layer without changing the structure of the interior. The salt flux through an interface appears to depend only on the rotation rate Ω of the inner cylinder, consistent with our previous study for an initial two-layer salt stratification (Woods *et al.* (2010) *J Fluid Mech.* **663**, 347-357).

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