Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Characterising the structure of quasi-periodic mixing events in stratified turbulent Taylor-Couette flow[1] KANWAR NAIN SINGH, JAMIE PARTRIDGE , STUART DALZIEL, DAMTP, University of Cambridge, C.P. CAULFIELD, BPI/DAMTP, University of Cambridge, MATHEMATICAL UNDERPINNINGS OF STRATIFIED TURBULENCE (MUST) TEAM — We present results from experiments conducted to study mixing in a two-layer stably-stratified turbulent Taylor-Couette flow. It has previously been observed that there is a quasi-periodic mixing event located at the interface separating the layers. We observe, through conductivity probe measurements, that the power of the mixing event in the frequency spectrum of the density data at the interface is higher when measured near the inner cylinder than in the middle of the annular gap. This is consistent with Oglethorpe's (2014) hypothesis that the mixing structure is triggered near the inner cylinder, and then advects and decays or disperses radially. We also observe that at $Ri = \frac{g' R_o}{(R_i \Omega_i)^2} \sim 7$, where R_i, R_o are the inner and outer cylinder radius, respectively, g' the reduced gravity characterising the density jump between the layers and Ω_i is the rotation rate of the inner cylinder, the power drops significantly at all radial locations, which is reminiscent of the onset of the enhanced flux regime as observed by Oglethorpe et al. (2013). We perform experiments to characterise the spatial extent and dynamics of this mixing structure using particle image velocimetry (PIV) giving further insights into this important mixing process.

[1]EPSRC programme Grant EP/K034529/1 SGPC-CCT Scholarship

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Date submitted: 31 Jul 2017 Electronic form version 1.4