

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Layer formation and localisation in spanwise stratified plane Couette flow.¹ DAN LUCAS, Keele University, C.P. CAULFIELD, BPI & DAMTP, University of Cambridge, RICH KERSWELL, JOHN TAYLOR, DAMTP, University of Cambridge, MUST TEAM² — Recent research has shed light on the role of coherent structures in forming layers when vertically stably stratified turbulence is forced with horizontal shear (<https://arxiv.org/abs/1701.05406>). In the current work we investigate the role of stable stratification in modifying coherent structures in plane Couette flow when the mean shear is horizontal i.e. gravity points in the (vertical) spanwise direction. Direct numerical simulations reveal near wall layering and associated new mean flows in the form of flattened streamwise rolls. Stratification is also found to inhibit the vertical growth of localised structures, meaning that spanwise localisation in the form of deep relatively well-mixed layers are found which fill the wall-normal (horizontal) and streamwise extents. We also use this geometry to investigate the influence of stratification on the growth and localization of isolated turbulent spots using a recently developed adaptive control procedure (Taylor et. al. 2016 J. Fluid Mech. 808).

¹Funded by EPSRC programme grant EP/K034529/1

²Mathematical Underpinnings of Stratified Turbulence

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Date submitted: 31 Jul 2017

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