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Spots and stripes: Isolating the building blocks of intermittent stratified turbulence in plane Couette flow JOHN TAYLOR, ENRICO DEUSEBIO, DAMTP, University of Cambridge — We will describe results from direct numerical simulations (DNS) of stratified plane Couette flow, which we use to explore the boundary between laminar and turbulent flows in a stratified fluid. The flow is described by three nondimensional parameters, the Reynolds (Re), Richardson (Ri), and Prandtl (Pr) numbers. For moderate values of Re and Ri laminar and turbulent flows can co-exist in a spatio-temporally intermittent flow. In large computational domains, laminar and turbulent regions spontaneously form stripes, reminiscent of those seen in transitional unstratified Couette flow at lower Re. We will present two sets of numerical experiments. The first set start with a fully developed stratified turbulent state, and abruptly increase Ri. The flow re-laminarizes for sufficiently large increases in Ri, although turbulent production persists throughout the decay phase. Using insights gained from the decay simulations, a new control scheme is devised, whereby Ri is adjusted based on the rate of change in TKE. Using this strategy, we have isolated localized turbulent spots in stratified turbulence. These newly found flow states lie near the boundary separating laminar and intermittent turbulence and may help describe generic features of stratified turbulence.

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