

Abstract Submitted  
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**Instabilities, exact coherent structures and layer formation in horizontally shearing body-forced stably-stratified flow**<sup>1</sup> DAN LUCAS, DAMTP, University of Cambridge, C.P. CAULFIELD, BPI & DAMTP, University of Cambridge, RICH KERSWELL, University of Bristol — We consider turbulence driven by a large scale horizontal shear by way of the Kolmogorov flow (sinusoidal body forcing) and a background linear stable stratification imposed in the third direction. This provides a tractable arena to investigate the formation of coherent structures, which in this case organise the flow into horizontal layers by inclining the background shear as the strength of the stratification is increased. The coherent structures can be traced back to new instabilities of the base flow which have a vertical wavelength depending on Richardson number. We investigate how the vertical lengthscales observed in the turbulence are related to the exact solutions and compare to the other well studied examples of instability driving layer formation. We also expose the chaotic motions of the stratified turbulence by locating unstable periodic orbits embedded therein.

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