Abstract Submitted
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**Turbulent structures in Kolmogorovian shear flows: Models** MATTHEW CHANTRY, LAURETTE S TUCKERMAN, PMMH (UMR 7636 CNRS - ESPCI - UPMC Paris 6 - UPD Paris 7 - PSL), DWIGHT BARKLEY, University of Warwick — Oblique patterns of turbulence are observed immediately beyond transition in wall-bounded shear flows with two unconstrained directions. Despite the ubiquitous nature of these structures, simple descriptions obtained directly from the Navier-Stokes equations are lacking. To this aim we examine Waleffe flow, a sinusoidal shear flow, $U \sin\left(\frac{\pi}{2}y\right)$, driven by a body force and stress-free boundary conditions at $y = \pm 1$. After establishing the ability of Waleffe flow to capture turbulent bands we study a series of models, capturing the shear dependent direction with a small number of Fourier modes. With only one nonzero Fourier wavenumber the fundamentals of bands are already observed. This minimal system offers the perfect testbed to study the emergence of bands. Considering small increases to the number of modes we find the rich behaviour associated with plane Couette flow. These models form a fascinating midpoint between the full Navier-Stokes equations and the minimal SSP model.

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