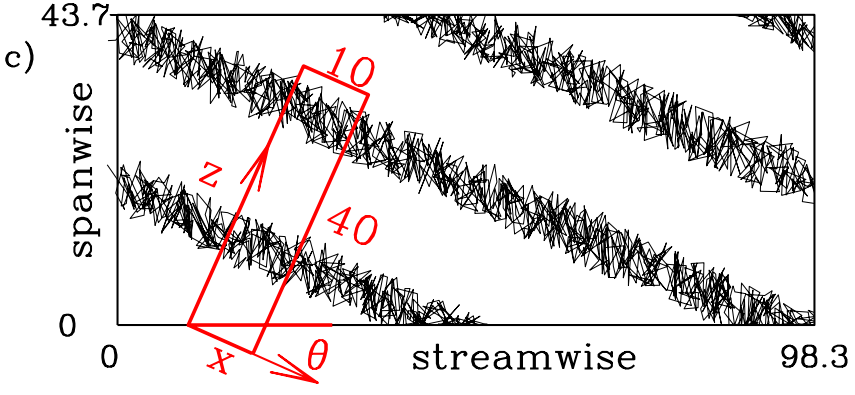
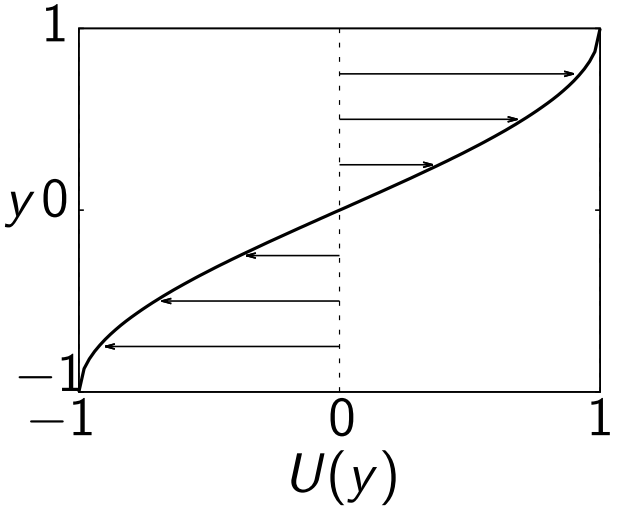
Turbulent bands in a planar shear flow without walls

M. Chantry[1] & L. Tuckerman[1] & D. Barkley[2]
[1] PMMH, ESPCI & [2] University of Warwick

Waleffe flow

- $\mathbf{U}_{lam} = \sin\left(\frac{\pi}{2}y\right)\hat{\mathbf{e}}_x$
- Stress-free boundary conditions.
- Linearly stable

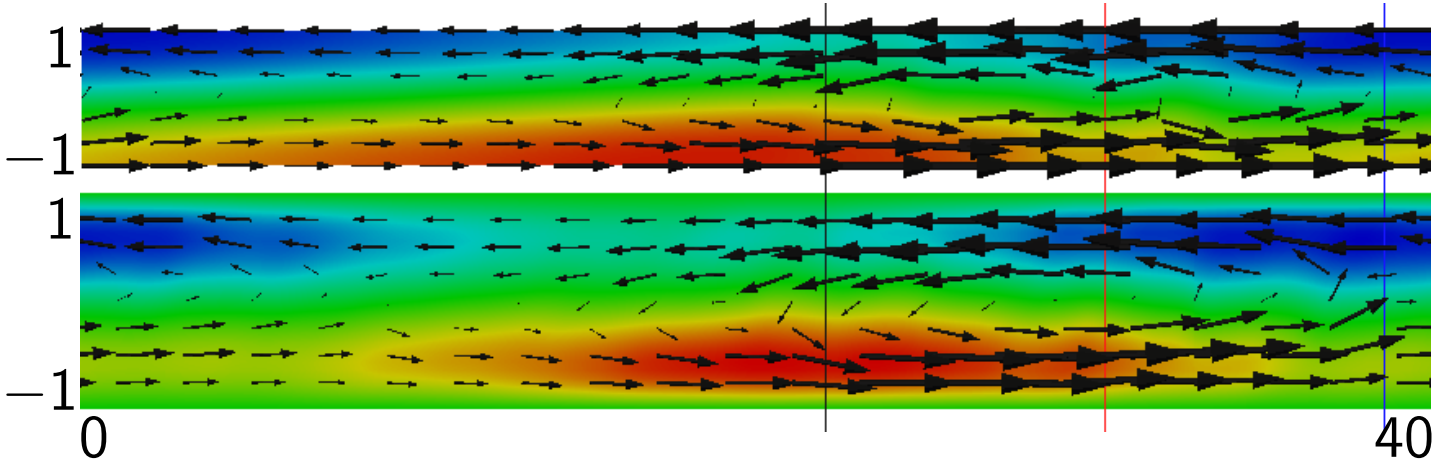


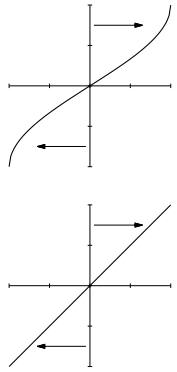


- Coherent structures tilted.
- Simulate in titled domain.

Bands: Waleffe vs plane Couette flow

Waleffe flow, $Re = 225$, $[10, 2, 40]$





Plane Couette flow, $Re = 350$, $[10, 2, 40]$

Model flow:
Waleffe using 4 Fourier wavenumbers in y.
Bands still exist.