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| Title: | Rapidly rotating flow with weak stratification |
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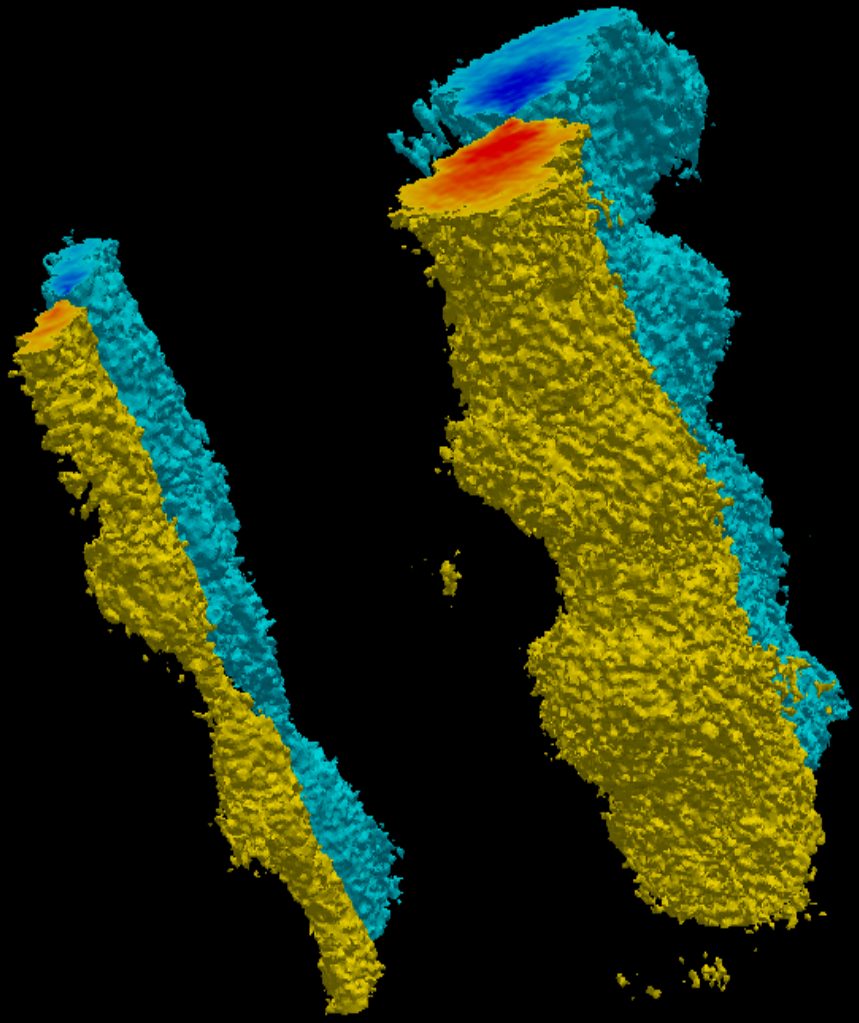
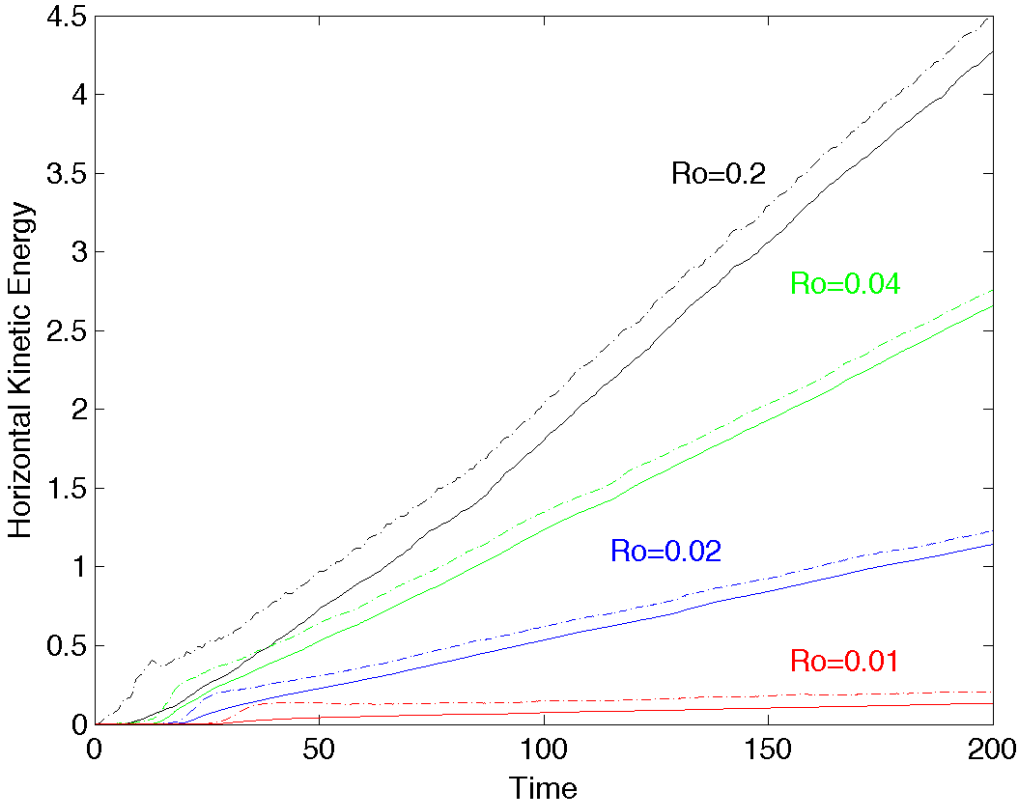
# Formation of columnar vortices in a rapidly rotating fluid:

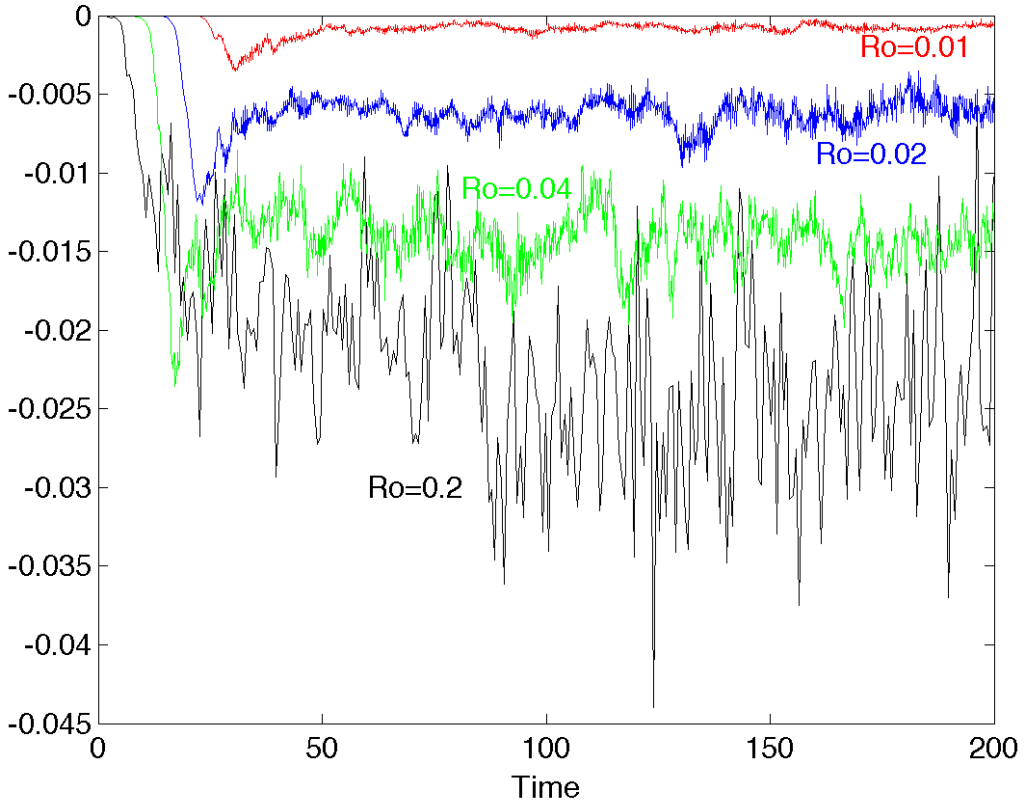


# Approaching the limit of infinitely fast rotation

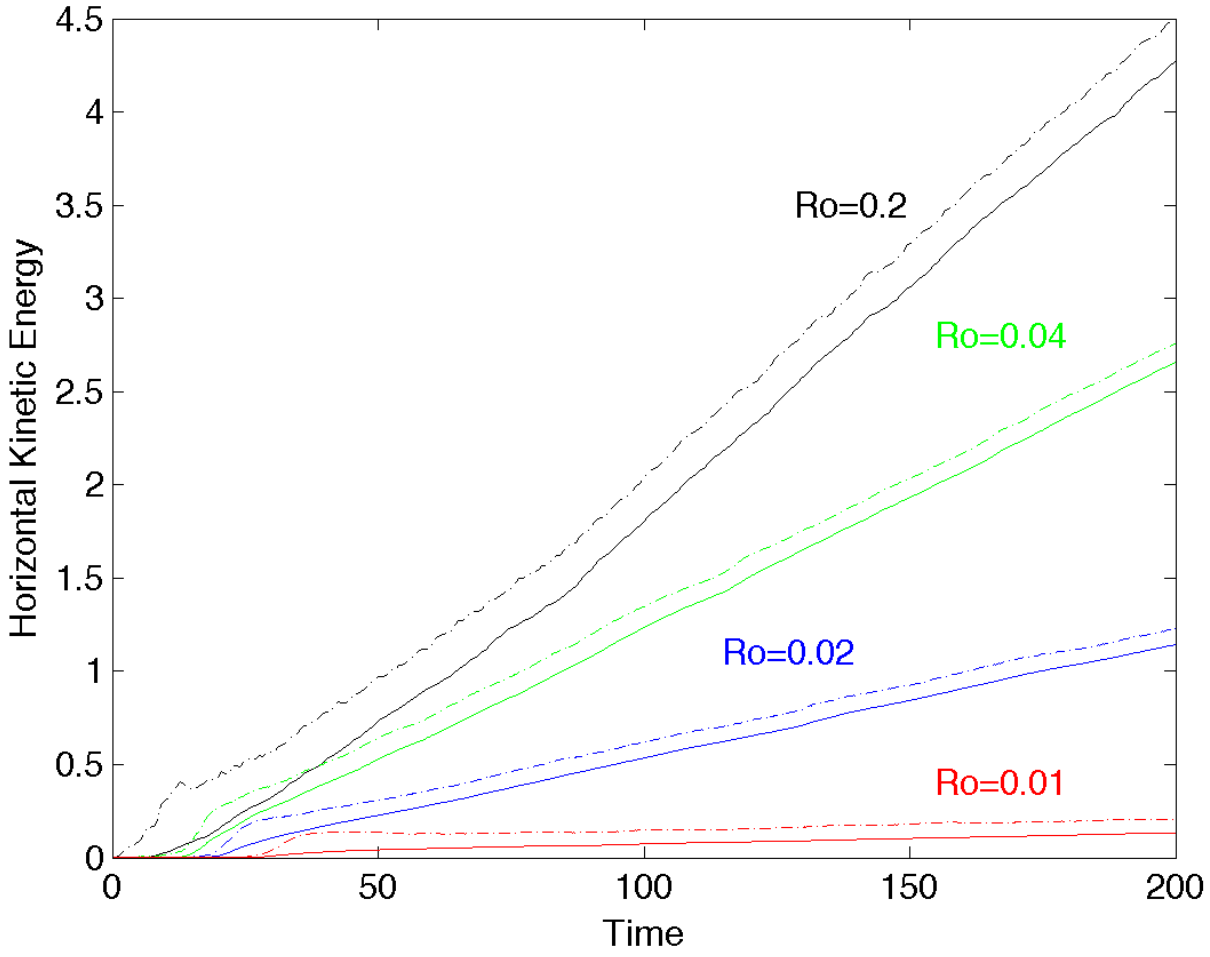
$$\frac{1}{2}\frac{d}{dt}\left\|\vec{v}_H^S\right\|^2 = -\int \vec{v}_H^S \cdot \langle [\vec{v}' \cdot \nabla \vec{v}']_H \rangle_z \, d\vec{x}$$

Theoretically as the rotation rate goes to infinity (Ro->0 here) the 'slow' component of the flow determines the full evolution of the system.
Here we decompose the full solution into 'slow' S and fluctuating ' components.
The left plot below is the full horizontal kinetic energy (upper, dashed lines) and 'slow' horizontal kinetic energy (lower solid lines). Note that the difference appears to be constant for all time.
The right plot below is the exchange of energy from the fluctuations to the 'slow' component. Note that it has a definite sign, meaning all the fluctuating energy is converted to 'slow'.



# Approaching the limit of Fast Rotation: where does all the energy go?




- The fluctuating components of the solution act as a conduit to move energy (and hence the entire state) closer to the 'slow' state.
- In 'Math-speak':
  - *There is sufficient numerical evidence that the quasi-slow manifold (or attractor) is (energetically) dynamically, asymptotically stable.*