Wave Forcing in a Rotating Cylindrical Flow

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Inertial waves are present in rotating fluid flows

Past work: over-reflection from a sheared region of fluid as driving force in spherical Couette geometry

Hide and Titman (1967): detached shear layers in a cylinder-disk system

We examine fluid flow in and near the boundary layer of the disk
Experimental Setup

- Rossby number: -1
  - $\Omega_o = 1$ Hz
  - $\Omega_i = 0$ Hz

- Ekman number: $6.87 \times 10^{-5}$

$Ro = (\Omega_i - \Omega_o)/\Omega_o$

$E = \nu/(\Omega_o L^2)$
Particle Image Velocimetry

QuickTime™ and a Motion JPEG OpenDML decompressor are needed to see this picture.
Radial Jets
Turbulent Power Spectrum
Mean Angular Momentum
Conclusions

• Unclear what forces large-scale waves
• Large traveling vortex—interacting with disk edge, affecting angular momentum transfer?
• Disk oscillations, topographical effects dominate system
• Does over-reflection play a role?

Future Work

• Optimize data analysis
• Refine experiment to minimize error
• Lower Ekman number: increase speed, temperature
• Lower Rossby number: counter-rotate