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Wide-Gap Taylor-Couette Flow Experiments with Astrophysical Relevance M.J. BURIN, J. GOODMAN, H. JI, E. SCHARTMAN, W. LIU, Princeton University — Most astrophysical accretion disks are thought to be turbulent due to magnetohydrodynamic effects. For cool disks however, such as those around protostars, purely hydrodynamic turbulence may be essential. It is claimed that turbulence could occur in these centrifugally-stable shear flows at a sufficiently high Reynolds number (*Re*) via subcritical instabilities. However, with *Re*-limited simulations and only a handful of relevant experiments to date, there is current uncertainty on both the truth and significance of this claim. Laboratory Taylor-Couette flows may in principle be able to provide an avenue for investigating this issue. Towards this end, a Taylor-Couette apparatus having an aspect ratio near 2 has recently been constructed that generates centrifugally-stable (co-rotating) flows with *Re* up to $\sim 10^7$. To obtain velocity profiles similar to gravitationally-bound systems, the Ekman circulation typical of wide gap flows had to be reduced substantially. This was accomplished with increased boundary controls, namely a novel differential end cap design, whose efficacy we discuss. Initial experimental data comes from two primary diagnostics: Laser Doppler Velocimetry, providing average and r.m.s. velocity information, and motor-drive torque, providing a gross measure of angular momentum transport.

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