Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Torque scaling in turbulent Taylor-Couette flow with independently rotating cylinders MATTHEW S. PAOLETTI, University of Texas at Austin, DANIEL P. LATHROP, University of Maryland at College Park — We present experimental studies of the turbulent flow of water between independently rotating cylinders. The Taylor-Couette system is capable of both strong turbulence ($Re > 2 \times 10^6$) and rapid rotation. The torque required to drive the inner cylinder and the wall shear stress at the outer boundary are precisely measured as a function of the two angular velocities Ω_1 and Ω_2. We find that the dynamics, which are fully determined by the Reynolds number Re and Rossby number $Ro = \Omega_1 - \Omega_2/\Omega_2$, are different in four different regions of the (Ω_1, Ω_2) parameter space. Our measurements allow us to estimate the skin friction coefficient c_f. We compare our measurements of c_f with those of previous experiments and discuss the potential relevance for angular momentum transport in astrophysical flows.

Matthew S. Paoletti
University of Texas at Austin

Date submitted: 04 Aug 2010 Electronic form version 1.4