Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Numerical simulations of magneto-rotational turbulence in cylindrical geometry.[1] ALEKSANDR OBABKO, University of Chicago, FAUSTO CATTANEO, University of Chicago / Argonne National Lab, PAUL FISCHER, Argonne National Lab — Inspired by the puzzle of anomalous angular momentum transport in accretion discs, direct numerical simulations of magneto-rotational turbulence are performed in cylindrical Couette geometry. We show that in strongly supercritical regimes, the flows act as efficient dynamos and the turbulence persists even in the absence of an externally imposed magnetic field. The mechanism responsible for the saturation amplitude of the turbulence involves both an increase in dissipation and a modification of the background rotational profile. The angular momentum transport is enhanced from its collisional value by a factor of the order the Reynolds number of the fluctuating velocity. Despite approximate equipartition between the velocity and magnetic fluctuations, the transport is mostly associated with the Maxwell stresses due to correlation of the magnetic fluctuations induced by their kinematic interaction with the background rotational shear.

[1]This work is supported by the NSF sponsored Center for Magnetic Self-Organization

Aleksandr Obabko
University of Chicago

Date submitted: 01 Aug 2007 Electronic form version 1.4