Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

3-D MHD Simulation of the Accretion Disk Corona A.Y. PANKIN, Lehigh University, Z. MIKIC, V. TITOV, SAIC, J. GOODMAN, D.A. UZDENSKY, Princeton University, D.D. SCHNACK, University of Wisconsin — Evolution of a magnetic loop in an accretion disk corona is studied by using the resistive MHD code MAB. Axisymmetric corona and infinitesimally-thin accretion disk with the Keplerian velocity profile is used as the initial state. In the accretion disk, conservation of angular momentum prevents the accretion. The microscopic resistivity and viscosity are too small to explain the accretion rate inferred from observations. In this work, we test an idea that the evolution of coronal magnetic fields might make differential rotation flows in the disk to be unstable by leading to the development of coronal magneto- rotational instability (MRI) and enhancement of angular momentum transport in the disk. In our computer simulations, the MHD equations for the accretion disk and its corona are modeled separately. The poloidal component of magnetic field and the velocity field in the disk are used as a boundary condition to advance the coronal flows. The toroidal and radial components of magnetic field are computed in the corona simulation and their boundary values are used in turn to advance the accretion disk flows. This provides a feedback loop between the MHD flows in the accretion disk and its corona. In this report, the evolution of a single coronal magnetic loop and the corresponding angular momentum transport in the disk are considered.

A.H. Kritz
Lehigh University

Date submitted: 21 Jul 2006 Electronic form version 1.4