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Simulation of MHD collimation from differential rotation CHRISTOPHER CAREY, CARL SOVINEC, University of Wisconsin — Recent observations indicate that astrophysical outflows from active galactic nuclei are permeated with helical magnetic fields[1]. The most promising theory for the formation of the magnetic configurations in these magnetically driven jets is the coiling of an initial seed field by the differential rotation of the accretion disk surrounding the central object. We have begun simulations that are relevant to these Poynting jets using the NIMROD code[2]. To simulate dynamics on length scales that are significantly larger than the accretion disk, the non-relativistic MHD equations are evolved on a hemispherical logarithmic mesh. The accretion disk is treated as a condition on the lower boundary by applying a Keplerian velocity to the azimuthal component of the fluid velocity and a prescribed flux of mass through the boundary. The magnetic field configuration is initialized to a dipole like field. Formation of a jet outflow is observed later in time. The initial field is coiled up and collimated, driving a large current density on the axis of symmetry. Slipping of magnetic field lines due to non-ideal effects has been investigated.

1. Asada K. et. al., Pub. of the Astr. Soc. of Japan, 54, L39-L43, 2002
2. Sovinec C. et. al., J. Comp. Phys., 195, 355-386, 2004

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