Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Magnetohydrodynamics inside a rotating sphere. DAVID MONTGOMERY[1], Dartmouth College, Hanover, NH 03755, PABLO MININNI[2], NCAR, Boulder, Colorado 80307, LEAF TURNER[3], Cornell University, Ithaca, NY 14853 — The equations of incompressible MHD are solved inside a uniformly rotating rigid spherical shell. The method of solution is a Galerkin expansion for the vector fields involved. The normal components of these fields vanish at the spherical boundary. The expansion basis functions are the spherical Chandrasekhar-Kendall eigenfunctions of the curl. A prescribed mechanical forcing excites a wide variety of dynamo behavior, all (so far) at unit magnetic Prandtl number. Key control parameters seem to be mechanical and magnetic Reynolds numbers, the Rossby and Ekman numbers (which we vary by varying the rotation rate of the sphere), and the amount of mechanical helicity injected. Magnetic energy levels and magnetic dipole behavior fluctuate strongly in a few eddy turnover times, but seem to stabilize as the rotation rate is increased, until the limit of the code resolution is reached. The detailed geometry of the mechanical forcing appears to be important. [P.D.Mininni et al, Phys. Fluids 18, 116602 (2006) and New Journ. of Physics (to appear, 2007).]

[1]supported in part by the NSF
[2]supported in part by the NSF
[3]supported in part by the NSF

David Montgomery
Dartmouth College, Hanover, NH 03755

Date submitted: 09 Jul 2007 Electronic form version 1.4