Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

3D low-beta magnetized plasma equilibria from external shaping A. HASSAM, J. TENBARGE, M. LANDREMAN, W. DORLAND, W. SENGUPTA, University of Maryland — A 3D nonlinear dissipative MHD code is in development to allow relaxation to low-beta MHD equilibrium inside a shaped 3D conducting boundary with prescribed conserved axial magnetic flux and no external current. Formation of magnetic islands is expected. Heat sources would be eventually introduced to allow the possibility of non-stationary convection depending on the stability properties of the accessible MHD equilibria. The initial development will be done using the code UMHD (Guzdar et al, PF, 1993). The initial emphasis will be on recovering expected physics in simpler 3D geometries. A primary objective is to minimize numerical boundary noise. In particular, codes which specify the normal magnetic field B.n on bounding surfaces are prone to noise generation. We plan to shape the boundary to conform to the desired field shape so that B.n is zero on the boundary. Non-orthogonal coordinates will be chosen to effect this. We will test noise reduction within the tangential field approach. Results obtained to date support this conjecture. Initial results from simple 2D code equilibria have been verified against analytic solution of equilibria in weak shaping. Initial results also recover the expected features of the Hahm- Kulsrud island formation solution. Work supported by US DOE.

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Date submitted: 14 Jul 2016 Electronic form version 1.4