Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Verification of spectral stabilization and numerically modeled external vacuum in NIMROD[1] C.R. SOVINEC, K.J. BUNKERS, University of Wisconsin-Madison — Revisions to the NIMROD algorithm (JCP 195, 355) aim to improve its utility for tokamak computations. The standard spectral-element expansion of all physical fields in continuous bases leads to convergence on MHD interchange from the unstable side in conditions of weak dissipation. This is a numerical impediment in nonlinear computations (Lutjens, CPC 95, 47). Adapting 1D numerical results (Sovinec, BAPS 57, No. 12) to NIMROD's elements, we consider incomplete modal expansions for auxiliary flow-divergence and parallel-vorticity fields. Their bases are just the highest order Legendre polynomial of each element. We show that convergence from the stable side is achieved when the auxiliary fields are used for either hyperbolic or parabolic correction terms, as verified in cylindrical interchange and toroidal ballooning computations. Separate development on applying distinct physical models to different regions of a domain allows coupling to external vacuum regions, suitable for modeling vertical displacement events and resistive wall modes. Results from initial tests are reported.

[1]Work supported by U.S. Dept. of Energy.

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Date submitted: 12 Jul 2013 Electronic form version 1.4