Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

High-beta extended MHD simulations of stellarators[1] T. A. BECHTEL, C. C. HEGNA, C. R. SOVINEC, Univ of Wisconsin, Madison, N. A. ROBERDS, Auburn University — The high beta properties of stellarator plasmas are studied using the nonlinear, extended MHD code NIMROD. In this work, we describe recent developments to the semi-implicit operator which allow the code to model 3D plasma evolution with better accuracy and efficiency. The configurations under investigation are an l=2, M=5 torsatron with geometry modeled after the Compact Toroidal Hybrid (CTH) experiment and an l=2, M=10 torsatron capable of having vacuum rotational transform profiles near unity. High-beta plasmas are created using a volumetric heating source and temperature dependent anisotropic thermal conduction and resistivity. To reduce computation expenses, simulations are initialized from stellarator symmetric pseudo-equilibria by turning on symmetry breaking modes at finite beta. The onset of MHD instabilities and nonlinear consequences are monitored as a function of beta as well as the fragility of the magnetic surfaces.

[1]Research supported by US DOE under grant no. DE-FG02-99ER54546.

Torrin Bechtel
Univ of Wisconsin, Madison

Date submitted: 12 Jul 2016 Electronic form version 1.4