Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Finite beta stellarator simulations using NIMROD[1] M. SCHLUTT, C.C. HEGNA, C.R. SOVINEC, University of Wisconsin-Madison, E. HELD, Utah St. University, S.E. KRUGER, Tech-X Corporation, J. HEBERT, Auburn University — In the first class of calculations shown, a vacuum equilibrium helical magnetic field is loaded into the geometry of a straight stellarator. The vacuum magnetic field is initialized to be symmetric or to have spoiled symmetry by adding 3D magnetic perturbations with helicities that are incommensurate with the dominant harmonic. These perturbations alter the magnetic spectrum, and create magnetic islands and regions of stochasticity. Finite beta equilibria are generated by introducing a heating source and employing self-consistent anisotropic transport. The connection between high beta properties of systems with saturated instabilities and equilibrium beta limits are discussed. The second set of calculations shown is motivated by recent results from LHD and includes a locked magnetic island in vacuum. A poloidal momentum source is added inboard of the island, creating a viscous drag on the island region. The phase of the locked island changes as the flow increases, and the island spontaneously disappears when the flow becomes high enough. In the third case presented, the Compact Toroidal Hybrid (CTH) is modeled. The vacuum field is loaded and a loop voltage is applied creating finite beta configurations.

[1]Supported by U.S. DOE Grant No. DE-FG02-99ER54546.

M. Schlutt
University of Wisconsin-Madison

Date submitted: 25 Jul 2011 Electronic form version 1.4