Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Development of MHD simulation capability for stellarators[1] C. R. SOVINEC, C. M. GUILBAULT, B. S. CORNILLE, T. A. BECHTEL, University of Wisconsin - Madison — Experiments have shown that stellarators and heliotrons are subject to soft limits and loss of equilibrium due to changes in magnetic topology as plasma-beta is increased. We expect that non-ideal, time-dependent simulations, such as those in Refs. [1-2], will contribute to the understanding of this behavior. An efficient numerical representation is important for achieving resolution at realistic values of physical parameters, so we are developing a variant of the NIMROD code that features 3D geometry with the logical-to-physical coordinate mapping using a 2D spectral-element/1D Fourier representation. The logical periodic coordinate is a generalized toroidal angle. The only restrictions are that the mapping is continuous and periodic. Improved convergence is demonstrated through anisotropic heat-transport computations. We also compare the numerical ideal-MHD spectra and divergence-constraint properties of different formulations for the magnetic advance, using magnetic field or vector potential with either H1 or edge elements. [1] K. Ichiguchi, et al., PPCF 55 014009 (2013); [2] T. A. Bechtel, C. C. Hegna, and C. R. Sovinec, this meeting.

[1]This work is supported by US DOE grant DE-SC0018642.

Carl Sovinec
University of Wisconsin - Madison

Date submitted: 29 Jun 2020 Electronic form version 1.4