

Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Study of extended MHD effects on interchange modes in spheromak equilibria¹ E.C. HOWELL, C.R. SOVINEC, University of Wisconsin-Madison — A study of extended MHD effects on linear interchange modes is performed using the NIMROD code [Sovinec & King JCP 2010]. A linear cylindrical equilibrium model is adapted from [Jardin NF 1982] to allow finite toroidal current at the edge. These equilibria are representative of SSPX discharges where currents are driven on the open field to keep the safety factor above $\frac{1}{2}$ across the profile [McLean et al POP 2006]. These spheromaks have weak magnetic shear, and interchange stability is an important consideration. The Suydam parameter, D , is scaled to study resistive and ideal interchange modes. The calculated MHD growth rate increases with D . The resistive interchange scaling $\gamma \sim \eta^{1/3}$ is observed for $D < \frac{1}{4}$. Calculations using the full extended MHD model are performed for a range of hall parameters Λ . This model includes gyro-viscosity, the hall term, equilibrium diamagnetic flows, and the cross-field diamagnetic heat flux. Two fluid effects in the full model are always destabilizing at large Λ . However, some cases exhibit a range of Λ where the growth rate for the full model is reduced relative to the MHD growth rate.

¹Work supported by US DOE.

Eric Howell
University of Wisconsin-Madison

Date submitted: 10 Jul 2014

Electronic form version 1.4