

Abstract Submitted
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Extended MHD Simulations of Spheromaks¹ E.C. HOWELL, C.R. SOVINEC, University of Wisconsin — Nonlinear extended MHD simulations of a spheromak in a cylindrical flux conserver are performed using the NIMROD code (JCP 195, 2004). An idealized series of simulations starting from a Grad-Shafranov equilibrium and small non-axisymmetric perturbations are performed to model the sustained decay phase. The resulting confinement leads to steep resistivity gradients. Strong current gradients develop, driving tearing modes that dominate the evolution of the spheromak. Absent in these simulations are the remains of $n=1$ fluctuations created during the formation process. A second series of simulations start from vacuum fields and model the full spheromak evolution, including the formation process where the $n=1$ fluctuations dominate. To understand the role of pressure driven instabilities in the evolution of the spheromak, a numerical diagnostic is developed to calculate the Mercier stability criterion from the axisymmetric fields.

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