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**Ongoing NIMROD Simulations of The Lundquist Number and Lambda Dependence of the HIT-SI Plasma** C. AKCAY, G.L. SUTPHIN, T.R. JARBOE, P.E. SIECK, A.J. REDD, BRIAN NELSON, University of Washington at Seattle, V.A. IZZO, MIT PSFC — The Steady Inductive Helicity Injected Torus (HIT-SI) is a spheromak that uses dual semi-toroidal injectors to provide constant steady inductive helicity injection (SIHI), which maintains toroidal current by generating poloidal flux with relaxation current drive. Relaxation produces and sustains a spheromak in the confinement region A three-dimensional resistive MHD model was developed using the Non-Ideal Magnetohydrodynamics with Rotation Open Discussion (NIMROD) code to simulate HIT-SI operation. Both decaying and sustained spheromak runs were simulated. Previous decaying spheromak simulations show amplification of the poloidal flux with Lundquist number 1000 or greater. The NIMROD model was then employed to explore the effects of injector lambda and Lundquist number ( $S$ ) on sustained plasma behavior in HIT-SI. In combination, the past and present results from these simulations form a data set with  $S$  ranging from 22 to 897 and injector lambdas ranging from 10 to 50. These data indicate that three distinct operating regimes exist with respect to Lundquist number and suggest that amplification of the axisymmetric mode increases with both  $S$  and injector lambda.

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