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**NIMROD Simulations of Decaying and Driven Hit-SI Plasmas**

CIHAN AKCAY, CHARLSON KIM, THOMAS JARBOE, BRIAN NELSON, University of Washington, VALERIE IZZO, General Atomics — The Steady Inductive Helicity Injected Torus (HIT-SI) is a spheromak that uses two semi-toroidal injectors to provide steady inductive helicity injection (SIHI), which produces and sustains a spheromak with significant toroidal current by generating poloidal flux using relaxation current drive. NIMROD's resistive MHD model is employed to study the relaxation behavior of decaying and SIHI-driven spheromaks. For decaying spheromaks, our results indicate an increase in poloidal flux amplification with increasing Lundquist number ( $S$ ). However, when a highly resistive edge layer is imposed, it dominates the overall resistivity and reduces the flux amplification at a given  $S$ . But, we observe more energy going into the non-axisymmetric modes in this case. For driven spheromaks we model the injectors as RFPs injecting flux and current at the appropriate locations on the annular regions of the machine. The first series of simulations will chart the spheromak sustainment and relaxation behavior as a function of  $S$  using the resistive MHD model.

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