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Comparison of Edge Magnetic Activity in the HIT SI Experiment to Numerical Simulations J.S. WROBEL, D.A. ENNIS, C.J. HANSEN, T.R. JARBOE, G.J. MARKLIN, B.A. NELSON, R.J. SMITH, University of Washington, Seattle — An array of surface magnetic probes embedded in the HIT-SI spheromak flux conserver resolves plasma dynamics from 10 Hz – 200 kHz. Amperian loops formed by sub-arrays at toroidal angles of 0°, 45°, 180°, and 225° allow non-axisymmetric toroidal plasma currents to be measured, capturing both injector and spheromak currents. Unipolar toroidal currents indicate formation and sustainment of a spheromak. The surface magnetic probe array provides an extensive and non-perturbative set of measurements for comparison with numerical models to further describe the activity seen in the experiment. A 3D Taylor-state solver developed by the PSI-Center computes the HIT-SI equilibrium as a superposition of independent injector and spheromak equilibria. Comparison of experimental results to the Taylor equilibrium at different injector driving frequencies shows general agreement of global magnetic field oscillations, but also regions of significant disagreement. Comparisons to calculated non-uniform λ ($\lambda = \mu_o \mathrm{j/B}$) equilibria with injector λ closer to experimental values will also be presented.

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