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Comparison of magnetic activity in MHD simulations of low and high frequency HIT-SI3 discharges[1] JAMES PENNA, University of Washington, KYLE MORGAN, CTFusion, Inc, AARON HOSSACK, THOMAS JARBOE, University of Washington — HIT-SI3 (Helicity Injected Torus- Steady Inductive 3) is an experiment that uses AC perturbations from three helicity injectors to drive a DC spheromak. Experimental evidence and extended magnetohydrodynamic (xMHD) MHD simulations of the previous HIT-SI experiment show differences between spheromaks formed at "low injector frequency" ($f_{inj} < 40$ kHz) and those formed at "high frequency" ($f_{inj} > 40$ kHz). Using Biorthogonal Decomposition (BD) to isolate and "subtract" injector and equilibrium-related magnetic activity from experimental magnetic probe measurements, plasma-generated periodic fluctuations have been observed in high frequency HIT-SI3 discharges, but not low frequency. The NIMROD xMHD code is used to simulate HIT-SI3 discharges by generating flux and current injector waveforms from experimental data, and applying them as boundary conditions on $\vec{E}$ and $\vec{B}$ in a simulation domain. High frequency and low frequency HIT-SI3 discharges have been simulated in NIMROD using zero-pressure, single temperature, and two-fluid temperature models. BD analysis is performed on these simulations and is compared to experimental data to study the appearance and cause of the periodic activity in high frequency.

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James Penna
University of Washington

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