Abstract Submitted
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Study of Varying Imposed Perturbation on the Growth of Non-Equilibrium n=2 Fields in HIT-SI3 (PhD Oral-24)[1] JAMES PENNA, KYLE MORGAN, CHRISTOPHER EVERSON, AARON HOSSACK, University of Washington, THOMAS JARBOE, Retired, CHRISTOPHER HANSEN, University of Washington, HIT TEAM — The Helicity Injected Torus Steady Inductive 3 (HIT-SI3) is a spheromak experiment that uses three AC transformer and solenoid pairs, known as helicity injectors, to form and sustain a spheromak with DC toroidal current. Changing the injector frequency and temporal phasing between injectors changes the toroidal Fourier spectrum of the applied perturbations. Biorthogonal Decomposition (BD) performed on data from a surface array of Mirnov probes reveals $n = 2$ activity not associated with the spheromak or injector currents. Past work has shown differences in this activity between different injector frequencies. The NIMROD xMHD code is used to simulate HIT-SI3 in an axisymmetric domain, with the injector fields modeled as boundary conditions on $\vec{E}$ and $\vec{B}$ at the injector locations. Linear NIMROD simulations of undriven equilibria generated from experimental data are used to attempt to find a linear growth rate for this $n = 2$ activity. Experimental data is also used to estimate this growth rate directly, and growth rates between frequencies will be compared. NIMROD simulations using constant, single and two-fluid temperature models at injector frequencies of 5, 15, 30, 45, 60, 75, and 100 kHz will be examined to investigate differences at low and high frequencies.

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