Abstract Submitted
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GPU-based feedback control of kilohertz-scale AC plasma drivers on the HIT-SI3 experiment[1] KYLE MORGAN, CTFusion, Inc., CHRIS HANSEN, AARON HOSSACK, BRIAN NELSON, University of Washington, DEREK SUTHERLAND, CTFusion, Inc. — The Helicity Injected Torus with Steady Inductive helicity injection (HIT-SI3) experiment studies the formation and sustainment of spheromak plasmas through the use of three fully inductive magnetic helicity injectors. Each injector is a semi-toroid connected to the spheromak volume that drives oscillating RFP-like field structures through the use of both toroidal injector flux and loop voltage, which are oscillated in phase to produce constant sign magnetic helicity injection, with operating frequencies are on the scale of 10-70 kHz. These injectors are then driven out of phase from one another to produce non-axisymmetric time-dependent perturbations on the plasma. A Graphics Processing Unit (GPU) based feedback control system has been implemented to control nonlinear plasma interactions between the different injectors during operation and drive the desired temporal waveform of the injector fields. Initial results of the GPU-controller operations are presented, including both demonstration of real-time pre-programmed operation and proportional control algorithms.

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