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Ion Dynamics in HIT-SI and HIT-SI3 with Comparisons to NIMROD and PSI-TET Simulations A.C. HOSSACK, R.N. CHANDRA, K.D. MORGAN, C.J. HANSEN, T.R. JARBOE, B.A. NELSON, C. AKCAY, B.S. VICTOR, University of Washington, T. HANAO, M. NAGATA, University of Hyogo — The helicity injected torus with steady inductive current drive (HIT-SI) is a spheromak with 55 cm major radius and bow-tie cross section. Two inductive helicity injectors, on opposite sides of the confinement volume, form and sustain the spheromak plasma. A one meter focal length, ion Doppler spectrometer with a high speed video camera is used to simultaneously image light from chords across toroidal and poloidal sections of HIT-SI. C III emission data were collected at 145 kHz, ten times the helicity injector frequency, to resolve the dynamics of the injectors. Plasma motion and flows are shown to be predominately driven by the oscillating helicity injectors. Measurements are compared to synthetic diagnostics and velocity fields from 3D, extended-MHD NIMROD and PSI-TET simulations. Both codes evolve the Hall-MHD equations with dynamic pressure. Biorthogonal decomposition of measured and synthetic spectroscopy data is presented as a noise filtering and analysis technique. Additionally, initial results from HIT-SI3 are presented. Work supported by USDoE and ARRA.

Aaron Hossack
University of Washington

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