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Overview of the Steady-Inductive Helicity Injected Torus D.A. ENNIS, C. AKCAY, W.T. HAMP, T.R. JARBOE, G.J. MARKLIN, B.A. NELSON, A.J. REDD, R.J. SMITH, B.T. STEWART, B.S. VICTOR, J.S. WROBEL, University of Washington — The Helicity Injected Torus-Steady Inductive (HIT-SI) investigates steady inductive helicity injection in a high-beta spheromak geometry. Semi-toroidal injectors external to the "bow-tie" shaped axisymmetric confinement region form and sustain spheromaks with over 30 kA of toroidal current using ~ 8 MW of input power. Recent upgrades of the plasma facing surfaces have increased the spheromak lifetime up to 10 ms and application of a background vertical field reduces current flipping. Further experiments demonstrate the scaling of toroidal current with injector voltage and flux amplitude, optimum phasing of the injector voltage and flux waveforms between 15° and 35° and reduced plasma wall interaction with constant gas flow. The HIT-SI diagnostic suite includes: multi-point Thomson scattering, FIR interferometry, Doppler, VUV and SPRED spectroscopy, bolometry, internal and surface magnetic probes. The magnetic field spatial structure and temporal evolution measured by internal and surface probes are well described by a fully-relaxed Taylor-state equilibrium model. Additional results of parameter scaling and spectroscopic measurements during steady state current drive will be presented.
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