Abstract Submitted
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Overview of the HIT-SI3 spheromak experiment[1] A.C. HOSSACK, T.R. JARBOE, R.N. CHANDRA, K.D. MORGAN, D.A. SUTHERLAND, C.J. EVERSON, J.M. PENNA, B.A. NELSON, University of Washington — The HIT-SI and HIT-SI3 spheromak experiments (a =23 cm) study efficient, steady-state current drive for magnetic confinement plasmas using a novel method which is ideal for low aspect ratio, toroidal geometries. Sustained spheromaks show coherent, imposed plasma motion and low plasma-generated mode activity, indicating stability. Analysis of surface magnetic fields in HIT-SI indicates large n =0 and 1 mode amplitudes and little energy in higher modes. Within measurement uncertainties all the n =1 energy is imposed by the injectors, rather than being plasma-generated. The fluctuating field imposed by the injectors is sufficient to sustain the toroidal current through dynamo action whereas the plasma-generated field is not (Hossack *et al.*, Phys. Plasmas, 2017). Ion Doppler spectroscopy shows coherent, imposed plasma motion inside $r \approx$10 cm in HIT-SI and a smaller volume of coherent motion in HIT-SI3. Coherent motion indicates the spheromak is stable and a lack of plasma-generated n =1 energy indicates the maximum q is maintained below 1 for stability during sustainment. In HIT-SI3, the imposed mode structure is varied to test the plasma response (Hossack *et al.*, Nucl. Fusion, 2017). Imposing n =2, n =3, or large, rotating n =1 perturbations is correlated with transient plasma-generated activity.

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