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Observations Supporting Electron Hyper-Viscosity Current Drive in the HIT-SI Spheromak A.C. HOSSACK, T.R. JARBOE, M.A. CHILENSKI, D.A. ENNIS, C.J. HANSEN, G.J. MARKLIN, B.A. NELSON, R.J. SMITH, B.S. VICTOR, J.S. WROBEL, University of Washington — Observations from HIT-SI are presented which support the model of electron hyper-viscosity current drive. In the model, current is driven across closed flux surfaces by electron dynamo action. An electron velocity gradient, combined with perturbations in the magnetic field near the closed flux surface, result in a current-driving viscous-like drag on the electrons in the closed flux region and an anti-current-driving drag in the adjacent externally-driven region. Magnetic Field alignment calculations for the HIT-SI geometry predict regions where current drive should occur; bolometric data show increased radiation from these regions and ion Doppler spectroscopy observations of bulk ion flows are consistent with the model. A preferred spheromak current direction in HIT-SI is consistent with the model because electrons exiting the injector drive current more effectively than electrons entering the injector. Plans for further study, including a new high-speed camera diagnostic on HIT-SI, are also presented. Work supported by USDoE.

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