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Magnetic Relaxation with Oscillating Field Current Drive on MST D.R. STONE, A.F. ALMAGRI, K.J. MCCOLLAM, J.S. SARFF, UW-Madison — In oscillating field current drive (OFCD), poloidal and toroidal ac magnetic fields are inductively applied to the plasma to drive dc plasma current through magnetic relaxation. Measurements of the dynamo mechanisms associated with magnetic relaxation are conducted during OFCD to better understand the relaxation dynamics and to possibly aid in optimizing OFCD performance. The fluctuation-induced dynamo $\left\langle \tilde{E} \cdot \tilde{B} \right\rangle \Big/ B \cong \left\langle \tilde{V} \times \tilde{B} \right\rangle - \left\langle \tilde{J} \times \tilde{B} \right\rangle \Big/ en$ and its constituent Hall dynamo are measured in the edge using inserted probes, and compared to $\eta J - E$. A passive secondary-emission capacitive probe for relatively high temperature edge plasmas was developed to measure the electric field fluctuations. During sawtooth relaxation events with OFCD the edge dynamo is enhanced compared to events without OFCD. Between events with OFCD the edge dynamo is a few V/m and opposes the edge current. This opposition is expected since the OFCD electric field adds current at the plasma edge and the dynamo tends to flatten the current profile. The linear stability of individual modes and their contribution to the dynamo is determined using pseudospectral techniques. This work is supported by the US DOE.

Douglas Stone
UW-Madison

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