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Hall dynamo, charge transport, and plasma rotation due to magnetic fluctuations in the MST RFP A. KURITSYN, G. FIKSEL, A.F. ALMAGRI, T.D. THARP, Center for Magnetic Self-Organization, Department of Physics, University of Wisconsin-Madison — Standard discharges in the Madison Symmetric Torus (MST) Reversed-Field Pinch (RFP) are characterized by cyclical rapid relaxation events (sawteeth), when substantial toroidal magnetic flux is generated in the plasma edge. In the framework of the two-fluid Ohm's law, it can be shown that Hall and MHD dynamo mechanisms play an important role. We will present detailed measurements of the radial profile of the Hall dynamo $\left\langle \tilde{\mathbf{j}} \times \tilde{\mathbf{B}} \right\rangle_{||}$ in the edge. These measurements were performed with a newly developed magnetic probe, which combines six magnetic coil triplets. Hall dynamo is peaked at the reversal surface, but is reduced near the edge, where, according to the past measurements, it is replaced by the MHD dynamo. We will also report edge measurements of the fluctuation induced non-linear $\left\langle \tilde{j}_{||} \tilde{B}_r \right\rangle_{F.S.}$ term, which is expected to play an important role in governing charge and particle transport, as well as to be significant in providing torques, which cause intrinsic (without external momentum input) plasma rotation. In addition, we will discuss experiments on inducing plasma rotation with bias electrodes inserted into the plasma edge. This work is jointly supported by the U.S. DOE and NSF.

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