Abstract Submitted
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Deep Insertion Probe Measurements on MST[1] J.C. TRIANA, A.F. ALMAGRI, D.J. HOLLY, J.R. KING, K.J. MCCOLLAM, J.S. SARFF, C.R. SOVINEC, UW-Madison, CMSO — Recent measurements and numerical simulations expose the importance of multiple fluctuation-induced forces and stresses in the self-organization processes of the RFP. Probe measurements in the region $\frac{r}{a} > 0.8$ show that the MHD and Hall dynamo terms ($\langle \tilde{\mathbf{v}} \times \tilde{\mathbf{b}} \rangle_{\|}and\langle \tilde{\mathbf{j}} \times \tilde{\mathbf{b}} \rangle_{\|}$) are both large, but with opposite trends in their radial profiles. Two-fluid NIMROD simulations predict complex radial profiles for these quantities, where one dominates the other in different regions. Fluctuation measurements deeper in the plasma would be valuable, and a magnetic probe for measuring $\langle \tilde{\mathbf{j}} \times \tilde{\mathbf{b}} \rangle_{\|}$ is first in development. Aided by MST's new programmable toroidal field power supply, RFP plasmas are reliably produced at low plasma current, allowing probe insertion to $\frac{r}{a} > 0.6$. The plasma parameters (e.g., Lundquist number) are closer to simulation values, making direct comparison with simulation more straightforward. Pseudo-spectral analysis will be used to measure the radial profile of the tearing mode structure, to compare with predictions from NIMROD and DEBS (single-fluid MHD).

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