Abstract Submitted
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Coupled Current-Momentum Relaxation in Reversed Field Pinch Plasmas[1] JOSEPH TRIANA, A.F. ALMAGRI, J.S. SARFF, J.P. SAUPPE, C.R. SOVINEC, UW-Madison and CMSO — Magnetic fluctuation induced emf and stresses have been shown to be critical in the self-organization process in RFP physics. These forces were previously measured in the edge of MST, ($r/a > 0.85$), revealing that the MHD dynamo, $< \tilde{v} x \tilde{B} >$, and the Hall dynamo, $< \tilde{j} x \tilde{B} > /en$, terms are both large but dominate Ohm's law at different radial locations. The term $< \tilde{j} x \tilde{B} >$ is the Maxwell stress, which appears in momentum balance for flow parallel to B, coupling the dynamo electric field to plasma momentum. NIMROD simulations that include the Hall term in Ohm's law and the gyro-viscosity in the momentum balance reproduce behavior akin to previous measurements in MST and predict a rich radial structure of the Hall term. We have developed a probe designed to measure the Hall term up to depths of $r/a > 0.5$ in plasmas with parameters suitable for NIMROD simulations, making direct comparison straightfoward. Using a toroidal array located at the plasma's edge and correlating with localized measurements of $\tilde{B}$, we can infer the radial structure of the individual tearing modes via pseudospectral analysis. These radial profiles will be compared with both NIMROD and DEBS (single fluid MHD) code predictions.

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