Abstract Submitted
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Reversed Field Pinch Equilibrium Reconstruction From Three-Wave Polarimeter-Interferometer Data[1] D.L. BROWER, B.H. DENG, W.X. DING, T. YATES, UCLA, J.K. ANDERSON, B.E. CHAPMAN, D. CRAIG, D.J. DEN HARTOG, K.J. MCCOLLAM, R. O'CONNELL, S.C. PRAGER, J.S. SARFF, M.D. WYMAN, UW-Madison — A high-speed three-wave far infrared (FIR) laser polarimeter- interferometer diagnostic is now available on the MST RFP to provide simultaneous measurement of electron density and toroidal current density profile evolution. These measurements along with the known average and edge toroidal magnetic field strengths can be fit with a two-parameter model to yield the toroidal magnetic field, q and pressure profiles. The derived on-axis toroidal magnetic field agrees quantitatively with independent MSE measurements under various plasma conditions. During the linear sawtooth ramp phase in standard discharges, q_0 decreases slowly towards 1/6 before, and increases to >0.2 after each sawtooth crash. In quasi-single-helicity discharges where the (1,5) mode dominates, q_0 hovers around 0.2, consistent with MHD simulation. In pulsed parallel current drive experiments, both current and toroidal magnetic field profiles peak on axis, while the λ-profile broadens. The stored thermal energy exceeds the sum of bulk electron and ion contributions by over 50%, indicating a significant contribution from energetic particles, consistent with CQL-3D modeling.

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