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Quasi-Single-Helicity Structures in the MST Reversed-Field Pinch W.F. BERGERSON, W.X. DING, D.L. BROWER, UCLA, B.E. CHAPMAN, J.S. SARFF, J.K. ANDERSON, D.J. DEN HARTOG, J.A. REUSCH, H.D. STEPHENS, University of Wisconson-Madison — Tearing modes produce a stochastic magnetic field, which degrades particle confinement in the reversed-field pinch (RFP), and characterize the multiple helicity (MH) state. MHD simulations predict an alternate to the MH state where the tearing modes condense into a single helical mode (SH). The term quasi-single helicity (QSH) describes plasmas with a dominant mode and smaller secondary modes. Studies have been carried out in the MST on both MH and QSH plasmas to investigate the fluctuation and confinement properties. For the first time the internal magnetic topology as well as magnetic and density fluctuations associated with these modes are measured directly in the plasma core using a high-speed, laser-based, polarimetry-interferometry diagnostic. The density and radial magnetic field fluctuations have been correlated in order to evaluate the magnetic-fluctuation-induced particle flux in the high-temperature core region. The electron temperature profile is 50 eV hotter in the region $0< r/a <0.75$ in the poloidal plane of the island O-point in QSH plasmas, as opposed to the X-point. Global particle confinement measurements are underway to identify properties of the QSH and MH states. This work is supported by the DOE.

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