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Statistical analysis of broadband electrostatic and magnetic turbulence in the MST reversed-field pinch DEREK THUECKS, ABDULGADER ALMAGRI, JOHN SARFF, PAUL TERRY, University of Wisconsin-Madison; Center for Magnetic Self Organization in Laboratory and Astrophysical Plasmas — The dominant magnetic fluctuations in the reversed field pinch arise from large scale tearing instabilities, but a broadband spectrum is observed. Recent measurements in MST suggest that the shorter wavelength fluctuations (spatially resolved to the ion gyro-radius scale, $\sim$1cm in our experiment) in both magnetic and electric fields arise via a nonlinear cascade driven by the tearing modes, but the source of the constituent fluctuations is poorly understood. The present work presents results from an insertable multi-tip probe capable of measuring electrostatic and magnetic fluctuations simultaneously in the edge plasma region. While magnetic fluctuations dominate the power spectrum in the plasma edge at low frequencies, electric field fluctuations become dominant at high frequencies. The cross-coherence between electric and magnetic fluctuations peak near the frequency where the fluctuation powers are found to be in equipartition. Bi-spectral analysis techniques are used to identify nonlinear interactions among electrostatic fluctuations. Additionally, the parabolic relationship between the skewness and kurtosis of the fluctuation PDFs may help illuminate the nature of these plasma fluctuations. NSF and DOE support this work.

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