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Experimental Study of High Frequency Magnetic Fluctuations in MST Y. REN, A. ALMAGRI, S.C. PRAGER, G. FIKSEL, J.S. SARFF, UW-Madison, CMSO — Reversed field pinch plasmas exhibit a broad spectrum of magnetic fluctuations, dominated by low frequency tearing modes ($\sim 10 - 30$ KHz) which are important for magnetic self- organization and transport. However, the origin of higher frequency fluctuations remains unclear. Here we propose that magnetic energy nonlinearly cascades from the tearing mode fluctuations to the shorter wavelength, high frequency fluctuations. This is suggested by observations that the high frequency power always increases or decreases in concert with the tearing mode amplitudes. The portion of the power spectrum adjacent to the low frequency tearing modes exhibits a power law similar to expectations from relevant nonlinear inertial cascade models. However, the power falls more rapidly at higher frequency, suggesting dissipation is important in a large portion of the spectrum. Interestingly, these spectral features resemble magnetic turbulence measurements in space plasmas. Radial profile measurements using a magnetic probe array show that the high frequency fluctuations are locally resonant modes which have $k_{||} \ll k_{\perp}$. The k-spectra also exhibit power law structure similar to the frequency spectra. An electrostatic probe is used to measure the electrostatic components of the high frequency fluctuations. The possible types of high frequency fluctuations will be discussed. This work is supported by NSF and DoE.

Yang Ren
University of Wisconsin-Madison

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