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Experimental study of anisotropic magnetic turbulence in a reversed field pinch Y. REN, A.F. ALMAGRI, G. FIKSEL, S.C. PRAGER, J.S. SARFF, P.W. TERRY, UW-Madison, CMSO — In many space and laboratory plasmas with a background magnetic field, magnetic turbulence is predicted to be anisotropic, *i.e.* the turbulence structure has a large perpendicular wavenumber ($k_\perp$) and much smaller parallel wavenumber ($k_{||}$). The observed small scale turbulence is often thought to cascade from large scale perturbations, forming inertial and dissipation ranges in the wavenumber power spectrum characterized with power and exponential laws, respectively. We carried out our experimental study of magnetic turbulence in MST, a medium-sized reversed- field pinch. MST plasmas exhibit a broad spectrum of magnetic fluctuations, ranging from low frequency coherent tearing modes (10-20 kHz) to high frequency fully developed turbulence (hundreds of kHz), and are ideal for studying magnetic turbulence. Radial profile measurements using a magnetic probe array show that the observed magnetic turbulence has a locally resonant feature, $\vec{k} \cdot \vec{B}$, and exhibits strong anisotropy with $k_\perp \gg k_{||}$ and $\delta B_\perp \gg \delta B_{||}$. We identified power and exponential law dependencies in the $k_\perp$ and $k_{||}$ spectra, which indicates a cascade picture for the origin of the small scale magnetic fluctuations, and the turbulence is shown to have a radial standing wave structure. We will discuss the observed magnetic fluctuation polarization and possible types of high frequency fluctuations. This work is supported by NSF and DoE.

Yang Ren
Princeton Plasma Physics Laboratory

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