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Statistical Analysis of Thomson Scattering Measurements for High-Frequency Temperature Fluctuations[1] LUCAS MORTON, DANIEL DEN HARTOG, ELI PARKE, JAMES DUFF, UW-Madison, LIANG LIN, UCLA
— The MST Thomson Scattering (TS) Diagnostic is used to study electron temperature (Te) fluctuations at frequencies ($\leq$30kHz) higher than those of global core-resonant tearing modes (m=1, n=5-8). Each of the twin TS lasers can fire 4-5 pulses at repetition rate of 12.5 kHz. Adjusting the time delay between the lasers (as low as 1 μs) allows probing of high-frequency (up to 1 MHz) fluctuations by autocorrelating the resulting Te measurements. This technique's effectiveness is demonstrated by comparing its results to those of tearing-mode-correlation studies. In 400 kA standard MST discharges, the dominant tearing modes have associated Te fluctuations of up to 25 +/- 5eV in the core. The TS autocorrelation measures total fluctuations of 42 +/- 5eV, indicating that tearing comprises much of the core Te fluctuations. With improved laser alignment, we investigate 400 kA improved confinement (PPCD) plasmas where global tearing activity is reduced and electrostatic turbulence may dominate electron thermal transport and fluctuation power. We also find no significant Te fluctuation (<5eV) correlated with edge-localized density fluctuations seen by the FIR interferometer in 200kA PPCD plasmas.

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