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Doppler Reflectometry Measurements of Medium Wavenumber Density Fluctuations and Zonal Flows in DIII-D[1] L. SCHMITZ, G. WANG, A.E. WHITE, J. JUSTINIANO, T.L. RHODES, W.A. PEEBLES, UCLA — Doppler reflectometry is a versatile diagnostic for poloidal plasma flow measurements and local density fluctuation spectra. Depending on the launch angle and frequency of the probing beam, the signal back-scattered from the plasma cut-off layer is sensitive to density fluctuations at a specific poloidal wavenumber k_θ (3 cm^{-1} $< k_\_ <$ 9 cm^{-1}, calculated using GENRAY ray tracing code). The plasma flow velocity v_θ is obtained with high time resolution from the Doppler shift ω_D of the back-scattered signal ($v_\theta = \omega_D/k_\theta$). Doppler reflectometry is well-suited for the detection of zonal flows, characterized by poloidal flow fluctuations ($v_\theta = k_r\Phi/B_\phi$). Zonal flows are thought to regulate the local turbulence level and radial correlation. We present first reflectometry measurements of geodesic acoustic modes (GAMs) and low frequency zonal flows in DIII-D Lmode plasmas ($0.6 < r/a < 0.9$). The interaction of these time-dependent plasma flows with medium wavenumber density fluctuations is investigated in order to study turbulence self-organization.

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