New Diagnostic for Doppler Reflectometry and Correlation Measurements of Electron Temperature and Density Fluctuations in DIII-D. L. SCHMITZ, A.E. WHITE, T.A. CARTER, W.A. PEEBLES, T.L. RHODES, G. WANG, UCLA, M.E. AUSTIN, UT-Austin — Local fluctuation measurements are required to evaluate the importance of different turbulent transport channels. Doppler reflectometry at 50-65 GHz is employed to measure the density fluctuation spectrum and the ExB flow velocity in DIII-D. A parabolic mirror is used to achieve a narrow beam spot size ($W_0 \sim 2.5$ cm). The plasma flow velocity is obtained from the measured Doppler frequency shift $f_D$ of the received signal: $v_{\perp} = f_D \lambda_0 / (2 \sin \theta)$, where $\theta$ is the antenna tilt angle (7-15 deg). An ECE correlation technique is used to extract electron temperature fluctuations (described in detail [1]). By matching the reflectometer X/O-mode cut-off to a particular ECE emission location, we expect that the correlation and relative phase $\phi_{T,n}$ of electron temperature and density fluctuations can be measured in quiescent plasmas (QH-mode). Quantitative comparisons of the measured $\tilde{n}$, $\tilde{T}$, and $\phi_{T,n}$ with gyrokinetic code results are now feasible.


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