Study of turbulence changes associated with ELM suppression by RMP in DIII-D

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Using correlation electron cyclotron emission (CECE) measurements near the top of the H-mode pedestal (ρ ∼ 0.9 − 0.96), we investigated the changes in broadband electron temperature fluctuations (\(\tilde{T}_e\)) in low wavenumbers (\(k_{\theta}\rho_s < 0.5\)) associated with ELM suppression with resonant magnetic perturbations (RMP), and also studied the nature of the \(\tilde{T}_e\) through profile analysis and linear stability analysis using gyro-Landau fluid model (TGLF) \[1\]. In addition, the correlation between turbulence changes and heat transport is also explored via power balance analysis. We first found that \(\tilde{T}_e\) increased significantly (≥ 40%) when ELMs were suppressed by RMP, rather than being due to the increase of RMP itself. A previous study in DIII-D showed that \(\tilde{n}_e\) measured by beam emission spectroscopy (BES) increased after ELMs were suppressed by RMP, consistent with \(\tilde{T}_e\) changes. However, we found that the changes in \(\tilde{T}_e\) with ELM phase with RMP are not always consistent with the \(\tilde{n}_e\) changes, which suggests the mechanism of \(\tilde{T}_e\) changes can be different from \(\tilde{n}_e\) changes. Details of fluctuation measurements and relevant analyses will be presented.

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