Reflectometry study on turbulence and ELM dynamics in limiter H–mode plasmas with and without RMP in TEXTOR.

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The ambient turbulence and ELM dynamics in the limiter H-mode TEXTOR plasmas were investigated with O-mode correlation reflectometry [1]. The correlation technique and fast acquisition allows to study the turbulence evolution on the ELMs time scale. The spectral and correlation characteristics of plasma density fluctuations were analyzed in the regimes with and without external resonance magnetic perturbations (RMP).

Turbulence level measured around the pedestal region evolves with ELM frequency; it decreases in between ELM stage below ohmic level manifesting the turbulence suppression near the pedestal. The turbulence reduction agrees well with the appearance of a steep gradient in the turbulence rotation measured with reflectometry. The position of the maximum of the plasma pressure gradient measured with the high resolution multi–pass Thompson scattering diagnostics [2] agrees with the position of the maximum of the turbulence rotation gradient. Two kinds of coherent modes are found in reflectometry spectra: f~12 kHz, m~5 and f=40–50 kHz, m=15–20 correspondingly. The first one is correlated with Mirnov coils data implying low m MHD mode.

The application of dynamic ergodic divertor (DED) [3], creating an RMP with base mode numbers m/n=6/2, results in a significant deterioration in the H–mode pedestal quality and plasma rotation. The gradient of turbulence rotation decreases significantly near pedestal when I_{DED} exceeds 3kA. It agrees with the results of Thompson scattering diagnostics showing a significant decrease of the pressure gradient at the pedestal. Moreover the amplitude of coherent modes also decreases with the amplitude of RMP indicating the possible link between ELM and QC modes which is discussed in the paper.

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