

P5.1090 Studies of poloidal rotation of plasma density turbulence with HIBP in the T-10 tokamak

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See the full abstract here <http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1090.pdf>

An ExB drift poloidal rotation is now considered as an effective mechanism to suppress the plasma instabilities [1]. So, the direct radial electric field E_r studies are important ingredient for understanding the role of $E_r \times B_t$ shear poloidal rotation in the turbulence suppression. In the T-10 tokamak, the mean values of E_r were retrieved via plasma electric potential measured by heavy ion beam probe (HIBP) [2]. On top of that, recent advances in the T-10 HIBP allows us to measure simultaneously the plasma potential and density fluctuations within the frequency domain up to 250 kHz in 5 poloidally shifted sample volumes with the 5-slits energy analyser [3] in the plasma core ($0.07 \text{ m} < r < 0.2 \text{ m}$). Cross-phase θ_{ij} between density fluctuations in two sample volumes poloidally shifted at Δx_{ij} , each observed by corresponding analyzer entrance slits with numbers i and j , gives the information on the poloidal turbulence rotation velocity: $V_{\text{turb}} = \Delta x_{ij} \cdot 2\pi f / \theta_{ij}$, $i, j = 1-5$, $i \neq j$ [4]. The ohmic plasmas with $m, B_t = 2.2 \text{ T}$, $I_{\text{pl}} = 230 \text{ kA}$, $n_e = 1 \times 10^{19} \text{ m}^{-3}$ were studied. For the stochastic low-frequency fluctuations (SLF) [5] with $f_{\text{SLF}} = 0-30 \text{ kHz}$, $V_{\text{SLF}} \sim 2.5-3 \text{ km/s}$ is directed towards the ion diamagnetic drift. For the low-frequency quasi-coherent fluctuations (LFQC) [6], $f_{\text{LFQC}} = 50-200 \text{ kHz}$, $V_{\text{LFQC}} \sim -10-15 \text{ km/s}$ is directed towards the electron diamagnetic drift. It has been shown that $E_r = -60 \text{ V/cm}$, so $E_r \times B_t$ rotation velocity V_{ExB} equals to $\sim -3 \text{ km/s}$ and directed to the electron diamagnetic drift. The effect of EC heating on the ExB and turbulence rotation will be also presented.

References

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