Studies of the plasma poloidal rotation in the T-10 tokamak using HIBP

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Plasma E × B drift poloidal rotation may suppress plasma instabilities and can also be connected with the transition to a better confinement regime (L-H transition) [1]. Radial electric field Er studies is an important task on the way to understanding the role of Er × Bt shear rotation in plasma turbulence suppressing.

In Т-10 tokamak (R = 1.5 м, а = 0.3 м) it has been shown that the velocity of Er × Bt rotation is equal to the velocity of plasma broadband turbulence rotation [2, 3]. Radial electric field Er in the core plasmas (7 cm < r < 21 cm) was measured with heavy ion beam probe (HIBP). Broadband turbulence rotation was measured with correlation reflectometry. Later, the velocity of plasma poloidal rotation was measured using charge-exchange recombination spectroscopy by the Doppler shift of spectral line of hydrogen-like ion of carbon С5+ [4]. Now with the five-slit energy analyzer of HIBP, which allows to conduct simultaneous measurements in five sample volumes, neighboring in plasma, there is an opportunity to measure plasma poloidal velocity as a phase shift between density fluctuations at two poloidally shifted sample volumes v = Δx∙2πf/θi,j , i, j = 1–5, i ≠ j [5, 6].

Is this work the velocity of broadband turbulence poloidal rotation will be calculated using HIBP and then it will be compared to Er × Bt drift velocity.

References

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