RADIAL ELECTRIC FIELD AND PLASMA ROTATION IN TUMAN-3M TOKAMAK

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This paper presents results of plasma potential profile and temporal evolution study performed in different operational modes of the TUMAN-3M tokamak: ohmic L and H-modes, NBI heated plasmas, discharges with strong MHD activity. Central plasma potential evolution was measured using the HIBP, whereas at the plasma edge the Langmuire probes were used for the measurement of radial electric field structure. A pronounced negative perturbation of the central plasma potential was observed during the H-mode transition caused by NBI heating pulse. At the plasma edge, evolution of toroidal rotation of impurity ions was measured spectroscopically. The rotation was found to behave in a qualitative agreement with the peripheral radial electric field dynamics measured by the probes.

It was observed that in the presence of strong burst of low frequency, low m,n MHD activity both central plasma potential and peripheral plasma electric field had became positive. This positive perturbation of the radial electric field destroyed "natural" negative H-mode radial electric field and caused backward transition clearly seen as a deterioration of confinement. Most probable candidate for the cause of the positive perturbation of the E_r seems to be a loss of fast electrons along partly destroyed magnetic field lines. The measurement of HXR radiation from the limiter supports this idea.

Another phenomenon observed with the help of HIBP is a strong quasicoherent plasma potential oscillation with frequency ~ 30kHz and with $\delta\phi/\phi >> \delta n/n$, revealing some characteristic features of GAMs. Spatial structure and temporal evolution of this GAM-like oscillation are discussed.