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Spectral measurements in the experiments with additional plasma heating on the tokamak FT-2

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The effective Lower Hybrid Heating (LHH) with L-H transition and experiment concerned with the Fast Plasma Current Ramp Up (CRU) has been studied on the FT-2 tokamak [1,2]. Unique diagnostic equipment allows us to obtain the required detailed information of plasma parameters on the FT-2 tokamak [2].

Spectral measurements in the visible region spectra are made by two monochromators providing observation of fast transport changes at the periphery of the plasma core during additional heating in hydrogen plasma. One of these monochromators with high spectral and temporal resolution ($\sim 0.5\,ms$) has been used for measurements of an ion temperature and poloidal rotation of plasma by registration of Doppler broadening and the Doppler shift of the impurity spectral line emission. Such spectroscopic measurements are realized shot by shot using a series of typical discharges of the tokamak. Monitoring of the line-chord-integrated intensity during such spectral measurements is provided by the second monochromator.

The observed intensity ratio of hydrogen emission lines H_α and H_β was used for the determination of the ratio of molecular-to-atomic hydrogen densities in region of the plasma periphery. Changes of this ratio is analyzed for Lower Hybrid Heating and L-H transition, when recycling of the working gas fast decreases. Such measurements of profiles of the hydrogen line emission during one short are provided by applying a television video camera (VC) as a radiation detector. Registration of the monochromator outward slit image with the VC has been carried out with $2.5\,ms$ time intervals.

The role of impurity in the plasma energy balance is analyzed by taking into account Z_{eff} profile evolution. These data are obtained from bremsstrahlung continuum measurements of plasma emission in infrared spectrum band. The details of Z_{eff} measurements are presented. Further ASTRA code modeling using experimental Z_{eff} profile evolution provides more correct analysis of the plasma core transport changes.

[1] Budnikov V N et al 1999 *Plasma Phys. Rep.* **25** 969

[2] Lashkul S I, Altukhov A B et al. 2005 *Czech. Journal of Phys.* **55** 341