High resolution spectroscopic measurements of edge plasma rotation and ion temperature in L- and H- modes at the COMPASS tokamak

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Properties of spectral lines radiated by fusion plasma impurities can be used to measure plasma rotation and ion temperature. Knowledge of both quantities is important for studying physics of L-H transition in tokamak plasmas. The change of poloidal rotation velocity seems to be interlinked with increased confinement in H mode, which can be shown on the evolution of the ion temperature in the plasma edge. In the COMPASS tokamak, carbon is among the main plasma impurities in connection with the installed carbon protection tiles. This makes the CIII lines, with wavelength around 465nm, good candidates for measurements of the edge plasma poloidal rotation and ion temperature. Such measurements are possible with the use of the two-grating spectrometer allowing for the wavelength resolution of 0.003nm. In this work the high-resolution spectroscopic measurement system installed at COMPASS is described. An analysis of a number of experiments is performed to study the evolution and the dependence of the edge plasma poloidal rotation and ion temperature on main plasma parameters as well as on the confinement mode.

References

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