

Polarization resolved plasma spectroscopy on LHD: Emission locations, temperature and flow of neutral hydrogen

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We have observed polarization-resolved spectra of atomic hydrogen, Balmer α λ 656.3 nm, with an absolutely-calibrated high-resolution spectrometer on the Large Helical Device at National Institute for Fusion Science [1]. The spectral profile have been analyzed by fitting the observed spectra, with a consideration of magnetic fields in the LHD plasma assuming two atom temperatures and we determined 2-dimensional emission locations, atom temperatures and hydrogen influxs for several lines of sight on a poloidal cross section. Discharges in configurations with and without the use of local island diverter head gave different results. The analyses on those results suggested to modify the present assumption used in the calculation. From the comparison of the observed spectra with the generated ones by a neutral-particle transfer code simulation including molecular hydrogen, the processes between the hydrogen atoms, molecules and ions are also discussed in details.

[1] A. Iwamae, M. Hayakawa, M. Atake, et al., Phys. Plasmas **12**, 042501 (2005).