

Observation of the High Density Edge Transport Barrier in CHS using Beam Emission Spectroscopy

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Formation of the edge transport barrier (ETB) has been observed in the high density region ($n_e \sim 1.2 \times 10^{14} \text{ cm}^{-3}$) of the Compact Helical System (CHS) [1]. It is observed in so-called the reheat mode discharge, which is an improved confinement mode of which the edge temperature increases due to the suppression of charge exchange loss caused by the neutral particle [2].

In the present study, the behavior of the density profile and the density fluctuations in the edge region accompanied by the formation of the high density ETB is investigated using the beam emission spectroscopy (BES). BES has been developed in CHS to simultaneously measure both local density fluctuations and gradients [3]. It detects emissions from the neutral beam atoms that are excited through collisions with bulk plasmas.

The initial result indicates that the density gradient just inside the last closed flux surface is steepened and the turbulence of the frequency at less than 20 kHz is suppressed at the formation of the high density ETB.

References

- [1] T. Minami, S. Okamura, T. Akiyama et al., Plasma Fusion Res. **1**, 047 (2006).
- [2] M. Isobe, K. Nagaoka, Y. Yoshimura et al., Fusion Sci. Technol. **50**, 229 (2006).
- [3] T. Oishi, S. Tanaka, S. Kado et al., Rev. Sci. Instrum. **75**, 4118 (2004).