Radial Structure of Edge Transport Barrier and Electrostatic Fluctuations in the Compact Helical System

Masaki Takeuchi[2] Kazuo Toi[1], Tsuyoshi Akiyama[1], Mitsutaka Isobe[1], Takashi Minami[1], Kenichi Nagaoka[1], Shin Nishimura[1], Chihiro Suzuki[1], Chihiro Takahashi[1], Yasuo Yoshimura[1], Keisuke Matsuoka[1], Shoichi Okamura[1] and CHS group[1]

E-mail address of the presenting author: m-takeuchi@nifs.ac.jp
[1] *National Institute for Fusion Science, Toki 509-5292, Japan*
[2] *Department of Energy Engineering and Science, Nagoya University, Nagoya 464-8603, Japan*

Structures and characteristics of fluctuations in the edge transport barrier (ETB) region are studied by using triple Langmuir probes installed toroidally separated locations (upper side of the vertically elongated section, and outboard and inboard sides in horizontally elongated section) in the Compact Helical System. ETB formation was studied in two different magnetic configurations which have circular and vertically elongated cross-section averaged over the magnetic surface. Electron density profile evolved for a few milliseconds just after transition, having a convex structure around the $\iota / 2\pi = 1$ rational surface ($\iota / 2\pi$: rotational transform) in both magnetic configurations, but at different toroidal location. At the toroidal location, radial electric field also evolved having a peculiar structure in both configurations. It is thought that these peculiar structures in density and radial electric field profiles are caused by the presence of the m / n = 1 / 1 magnetic surface (m, n: poloidal and toroidal mode numbers). The turbulent particle fluxes evaluated from the fluctuations of electron density and poloidal electric field decreased just after the transition in both magnetic configurations. A rapid vertical expansion and outward shift of the formed particle ETB were observed just after the transition in the vertically elongated configuration. In this paper, the similarities and differences in ETB structures and fluctuation characteristics are discussed for both configurations.