

§19. Electron Density and Temperature Profiles of H-mode Plasma Measured with YAG Thomson Scattering System

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The H-mode is an interesting and significant phenomenon for study of a plasma confinement. So far the H-mode has been observed mainly in a Tokamak type device. But H-mode transition is also observed in CHS, Heliotron/torsatron type device, where the rotational transform is controlled with a net plasma current.[1] The electron density profile on this plasma was measured with an HCN Interferometer using an Abel inversion method [2]. We have measured the radial profile of electron temperature and density of the H-mode every 20 ms with the newly developed YAG Thomson scattering system, which has capability of the multipoint measurement with relatively high time resolution by means of YAG laser with high repetition rate [3].

The H-mode experiment was carried out with co-injected neutral beams. In this case the absorbed power is about 350 kW. The total current is induced 30 kA at toroidal field  $B_t=1.2$  T. Figure 1 (a) show the radial profiles of electron temperature across the L-H transition. These profiles are obtained 15 ms before, 5 ms after, and 25 ms after the transition. At same time electron density profiles are also obtained as shown in Figure 1 (b). The central electron temperature is decreased slowly after the transition presumably due to density rise. But in the outer region the temperature is increased slightly. This increase occurs locally. On the other hand electron density is increased considerably in the outer region after the transition. The profile changes from a nearly parabolic one to hallow

one. Figure 1 suggests the formation of edge transport barrier in the H-mode.

These characters are similar to the tokamak H-mode.

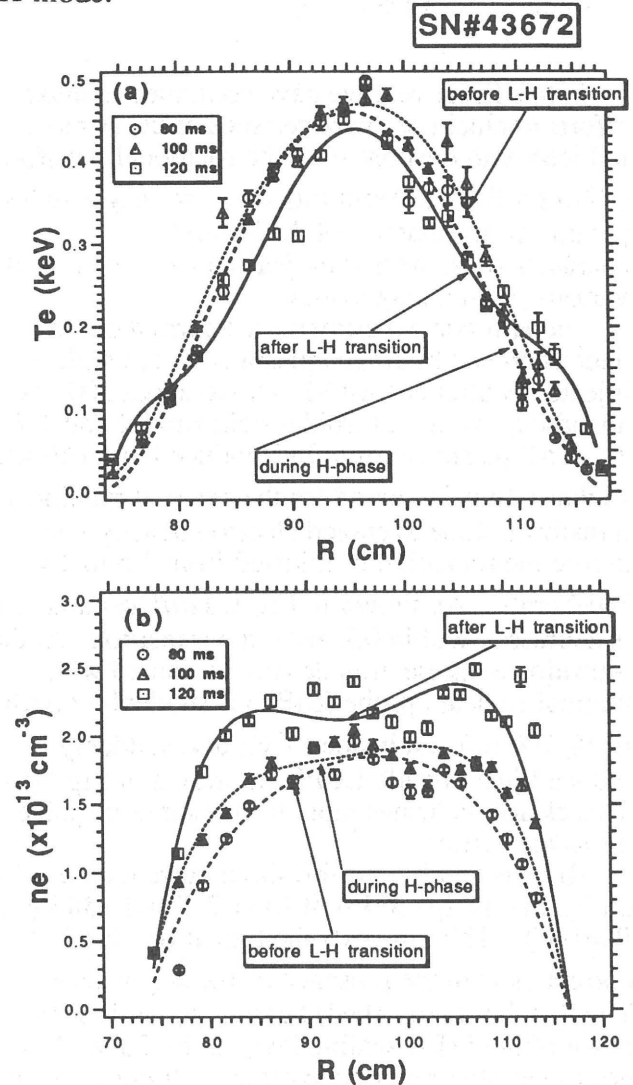


Fig.1 Radial profiles of electron temperature and density in the L-H transition measured with the YAG Thomson scattering system, where the L-H transition occurs at about 95 ms.

References

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- 2) Tanaka, K et al., Proc. 21st EPS Conf. on Controlled Fusion and Plasma Phys., part I Vol.18B. P432.
- 3) Narihara, K, et al., Rev.Sci.Instrum., to be published (1995)