§16. Temporal Evolutions of Electron Density Profiles in H-Mode Plasmas of CHS

Tanaka, K., Toi, K., Ejiri, A., Kawahata, K., Kubo, S., CHS Group
Arimoto, H. (PSC, Nagoya Univ.)
Okajima, S. (Chubu Univ.)

Temporal evolutions of electron density profiles across H-mode transition, which is triggered by the modifications of the rotational transform profile with a small ohmic heating current [1~3], are measured by an HCN laser interferometer with a good time resolution. This interferometer has two channels. One is fixed at the cneter and the other is scannable shot by shot in the region $0.35 \leqq \rho\ (=z/a_s) \leqq 0.91$, where z is the position measured from the equatorial plane and a_s, which is the vertical half width of the last closed flux surface (LCFS), is 15.0cm. Figures 1 (a), (b) and (c) show the temporal evolutions of the plasma current, Dα intensity and line density respectively. The L-H transition occurred at t=115msec and the H-L transition at t=142msec. Dα intensity is suddenly decreased and the line density starts to increase at the L-H transition. Figure 2 (a) shows the temporal evolutions of the volume average density $\langle n_e \rangle$ and the central density $n_e(0)$, which are calculated by the elliptic Abel inversion[3], and Fig. 2 (b) shows the corresponding peaking factor defined as $n_e(0)/\langle n_e \rangle$. The peaking factor decreases continuously during almost whole H-mode phase. This indicates that the density profile becomes broader in the H-mode phase. In spite of continuous gas puffing and NBI heating until 130msec, the volume average density increases from 110msec until 130msec. This suggests that the particle confinement is improved in this phase. Although $\langle n_e \rangle$ decreases from 130 msec to 142 msec, the peaking factor remains at the low level and, as shown in Fig. 1 (c), the edge (ρ=0.77, 0.91) line density decays slower than other internal chords. Therefore, this suggests the particle confinement is also improved in this phase.

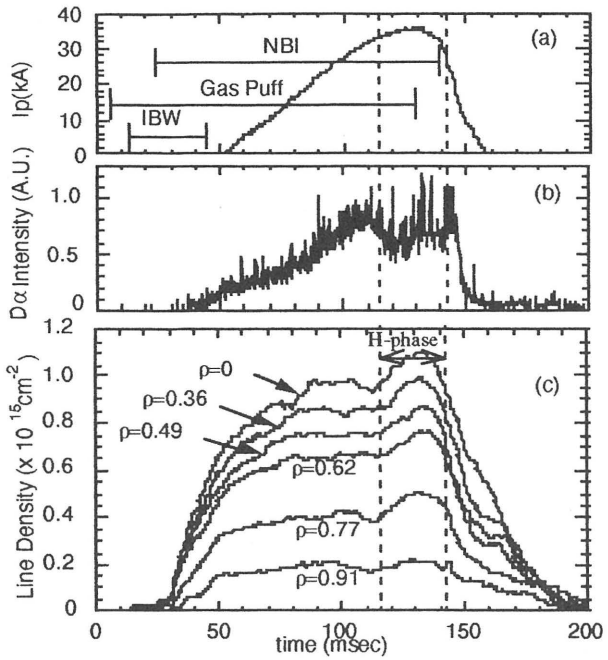

Fig. 1. Temporal evolutions of (a) the plasma current, (b) the Dα intensity and (c) the line density .

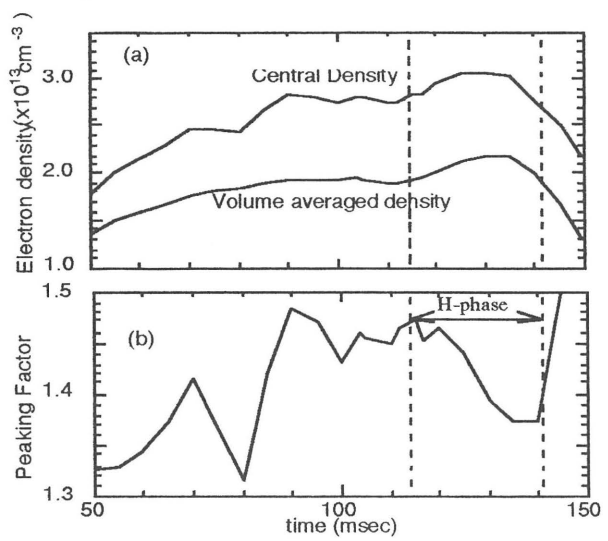

Fig. 2. Temporal evolutions of (a) the central density and the volume averaged density, (b) the peaking factor.

References
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