§25. Comparison of Electron Density Decay between Different Magnetic Axis Positions in CHS

Tanaka, K., Ejiri, A., Kawahata, K., CHS Group
Okajima, S. (Chubu Univ.)

Temporal evolutions of electron density profiles are measured by an HCN laser interferometer[1], and compared between the two different cases of magnetic axis position of NBI heated plasma. One is at Rax=92.1cm and the other is at Rax=97.4cm. Rax is the position of the vacuum magnetic axis on the equatorial plane. In the former case, the inboard side of the plasma is attached to the inner wall of the vacuum vessel and, in the latter case, the outboard side of the plasma is attached to the ICRF antenna. In this series of experiments, the ICRF antenna cuts the plasma edge and the plasma minor radius is reduced by about 10% at Rax=97.4cm.

Figure 1 (a) and (b) show the temporal evolutions of line density before and after turning off of the gas puffing in the two cases. In Figs. 1, Z indicates the position of the interferometer chords measured from the equatorial plane. The last closed flux surface is 14.6cm at Rax=92.1cm, and is 14.3cm at Rax=97.4cm. At Rax=97.4cm, the line density at Z=13.6cm is almost zero. This indicates the ICRF antenna cuts the plasma like a limiter.

Figure 2(a) and (b) show the Abel inverted density profiles just before and 25msec after turning off of the gas puffing. The density profiles at Rax=92.1 cm are clearly broader than those at Rax=97.4 cm. This is different from the previous results. Before installation of the ICRF antenna, the density profiles at Rax=92.1cm are more peaked than those at Rax=97.4cm[2]. The decay time, which is defined as $(1/n_e\ dn_e/dt)^{-1}$, of volume averaged density $\langle n_e \rangle$ and central density $n_e(0)$ are calculated from Figs.2. At Rax=92.1cm, the decay time of $\langle n_e \rangle$ is 120msec and the decay time of $n_e(0)$ is 530msec. At Rax=97.4cm, both decay times of $\langle n_e \rangle$ and $n_e(0)$ are 90msec. The decay time of $n_e(0)$ at Rax=92.1cm is much longer than that at Rax=97.4cm, although the decay time of $\langle n_e \rangle$ does not differ much each other in the two cases. These suggest the difference of particle transport between two cases exists especially in the central region of plasma

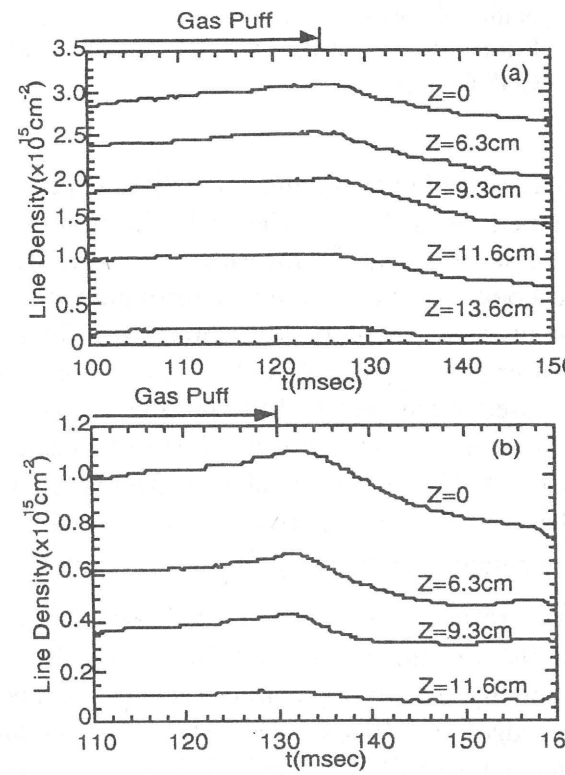

Fig. 1. Temporal evolutions of line density (a) at Rax=92.1cm and (b) at Rax=97.4cm.

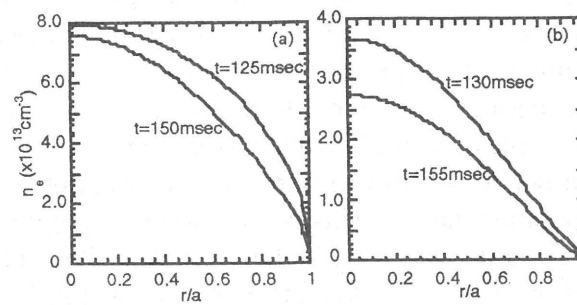

Fig. 2 Decay of electron density profiles after turning off of the gas puffing (a) at Rax=92.1cm and (b) at Rax=97.4cm.

References
1)Tanaka,K., et al., Proc.21st EPS Conf. on Controlled Fusion and Plasma Phys., Montpellier, 18B Part 1 (1994)423
2)Iguchi,H., et al., Plasma Phys. Control. Fusion 36 (1994) 1091