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The density profiles seem to change according to variety of the experimental conditions like R_{ax} , magnetic configurations, n_e and P_{heat} etc. Recent our results suggest the incoming neutral particle energy distribution plays an important role for understanding the n_e profile formation mechanism.

The comparison is made for $R_{ax}=92.1$ cm case to study an influence which the magnetic configuration directly gives on the density profile. The result is shown in Fig.1. Two different profiles are obtained from the same configuration, although it is rare cases that such a hollow profile is obtained at $R_{ax}=92.1$ cm. In the two discharges the edge T_e was very different. For the hollow profile case it was 19eV at $\rho=0.85$ ($T_{e0}=233$ eV), but for the peaked profile case it was 102eV ($T_{e0}=353$ eV).

The limiter was inserted into NBI plasmas with a hollow density profile. The result is plotted in Fig.2. It is understood that the peaked density profile is realized after insertion of the limiter. The T_e profile does not change for the two cases. From this result we can understand that the density profile is strongly affected by the existence of the limiter or vacuum wall.

The edge T_i (CVI charge exchange line) at $\rho=0.9$ is measured with the density peaking factor for different R_{ax} positions (see Fig.3), since the peak position of the radial neutral hydrogen distribution appears between $\rho=0.90$ and 0.95. The peaked density profiles tend to have a high edge T_i and are realized mainly for the limiter-dominated configuration. In contract to this, the flat density profiles have a low edge T_i for the divertor dominated case. It is noticed that the recycling rate R becomes too large for the divertor-dominated cases. Especially for $R_{ax}=101.6$ cm case, the value of R is close to 0.98

even in $n_e \leq 2 \times 10^{13} \text{cm}^{-3}$ [1]. A similar relation between n_e profiles and edge T_i is obtained for the reheat mode operation in the same configuration [2].

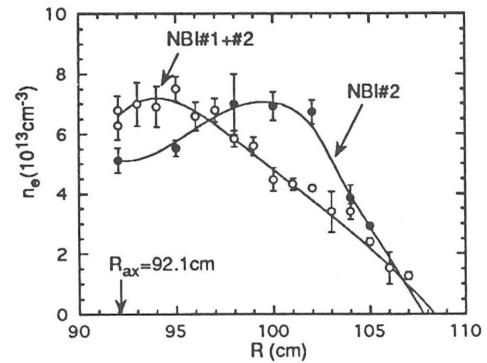


Fig.1 Two different radial n_e profiles obtained from the same configuration ($R_{ax}=92.1$ cm).

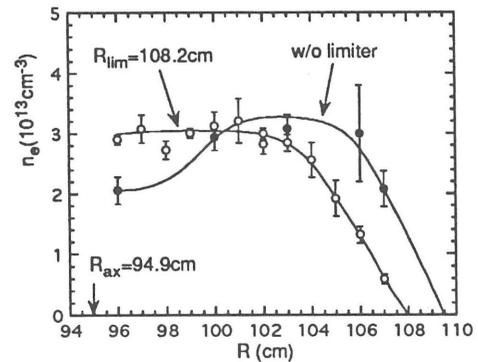


Fig.2 Radial n_e profiles with and without insertion of carbon-head limiter. The limiter was inserted ($z=20$ mm) from the bottom of the vertically elongated position.

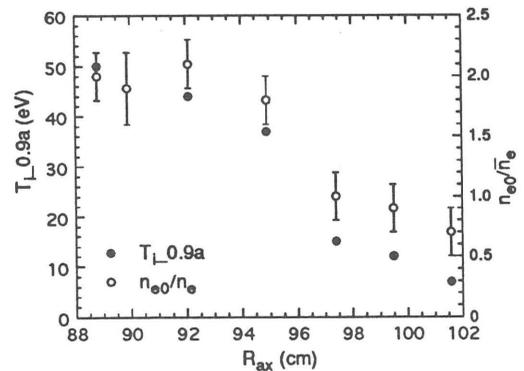


Fig.3 Comparison between edge T_i ($\rho=0.9$) and density peaking factor for different R_{ax} positions.

References

- 1) Morita,S., *et al.*, Fusion Tech. **27** (1995) 239.
- 2) Morita,S., *et al.*, (14th Int. Conf. Würzburg, 1992), IAEA-CN-56 Vol.2 (1993) 515.