## §22. Configuration Dependency of Energetic Tail Ion Distribution during ICRF Heating in LHD

Murakami, S., Isobe, M., Sasao, M.

ICRF heating experiments have been successfully done and have shown significant performance of this heating method in LHD. Up to 400keV of energetic tail ions have been observed by fast neutral analysis. In the experiments two configurations are mainly studied; one is the "standard" configuration ($R_{ax}$ = 3.75m) and the other is the "inward shifted" configuration ($R_{ax}$= 3.6m) in which the confinement of ripple trapped particle is improved drastically and the good confinement of energetic ions would be expected. However, we could not see clear difference in the measured energy spectrums of these two configurations. This would be related to the fact that the measured information is obtained as an integrated value along a line of sight.

To solve this problem we study the energetic tail ion distribution during ICRF heating in LHD using a global transport simulation code in 5-D phase space (GNET)[1]. We solve the drift kinetic equation of minority ion during ICRF heating in 5D phase-space introducing the linear Collision operator and the ICRF heating term by the wave-particle interaction.

The steady state distribution of the minority ions during ICRF heating is evaluated by GNET. We assume the same heating and plasma parameters as the experimental ones, where the RF heating power of about 2.5MW, the magnetic field strength at R=3.6m is 2.75T and the resonance region only exists $r/a$>0.5 in the $R_{ax}$= 3.6m configuration. Figure 1 shows the radial profiles pressure profile of minority ions. We can see the peak of pressure profile at $r/a$ ~0.5 in the $R_{ax}$ = 3.6m case. On the other hand we can see a broader pressure profile in the $R_{ax}$ = 3.75m case. The heat deposition profile also shows the broader profile in the $R_{ax}$= 3.75m case than that in the $R_{ax}$ = 3.6m case and the obtained heating efficiency is 40% higher in the $R_{ax}$ = 3.6m case.

Using obtained steady state distribution we simulate the count number of the fast neutral detector. No clear difference for two configuration results can be seen (Fig. 2) and this tendency agree with the experiemntal results.

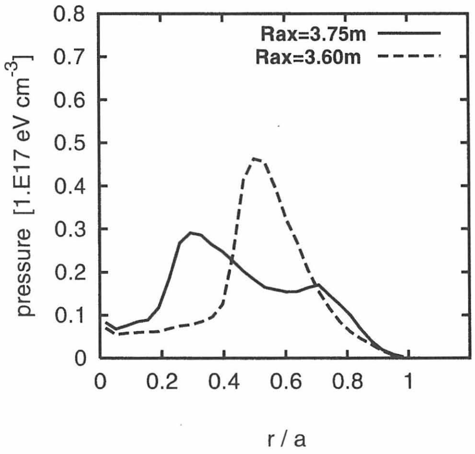


*Fig. 1* Pressure profile of minoiry ions during ICRF heaing in the LHD plasma.

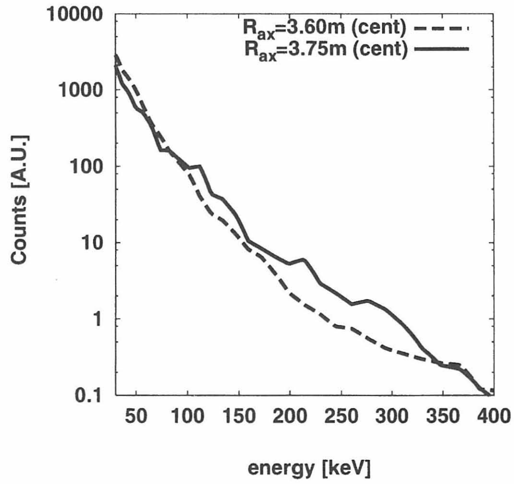


*Fig. 2* Comparisons of simulated count numbers of the fast neutral detector using the steady state distribution by GNET.

### REFERENCES

[1] Murakami, S., et al., Nuclear Fusion **40** (2000) 693.