

## §21. Study of Peripheral Plasma in Heliotron J by a Fast Camera

Nishino, N., Fukuyama, Y., Abe, T., Kaga, K., Sakurada, S., Honda, S. (Hiroshima Univ.), Mizuuchi, T., Sano, F., Kondo, K. (Kyoto Univ.)

The ICRF experiments in Heliotron J under various magnetic configurations were held in this year. It was observed that the peripheral turbulence was suppressed in the toroidal magnetic field of 5:2 (standard magnetic configuration) and 5:3 configurations. However, in the toroidal magnetic field of 5:1 there is no evidence of turbulence suppression. Typical plasma parameters are shown in Fig.1. From top to bottom, electron density, H $\alpha$  signal, ECE, Soft X-ray signals. The dashed line shows gas puff imaging (GPI) time. ICRF injected during the hatching time. ICRF#1 is the first, and ICRF#2 is the second. The increase and/or decrease of the ion saturation current were often observed during ICRF. At the same time the suppression of the filamentary structure were observed in the camera image only during ICRF#2. Fig. 2 shows typical camera images of ICRF discharge. Before ICRF#2 the filamentary structure was seen, however, during ICRF#2 the structure was not seen and two feet lines of edge magnetic field were seen clearly. It was unclear that the relationship between the suppression of the filamentary structure and the decrease of the ion saturation current. The ratio of local H $\alpha$  intensity near the probe and the ion saturation current is almost

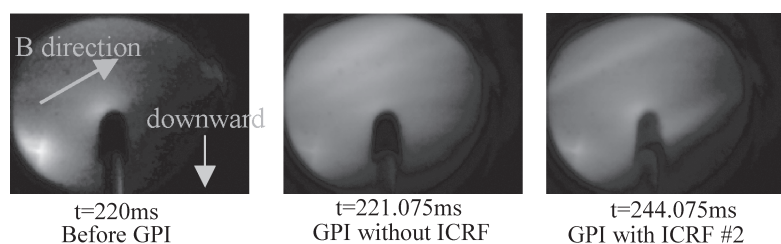


Fig.2 Images of filament-like structure in Heliotron J plasma

proportional to the local neutral density. This ratio during ICRF#2 increased in comparison with before and after ICRF#2. This means the local neutral density near the probe tip increased during ICRF#2. ICRF#2 used upper antenna, and the whisker field lines near the antenna come to be that in front of the camera image. Therefore, it might be considerable that the antenna interact the peripheral plasma stimulated by ICRF. The reason of the changes of the ion saturation current was not fully understood, however, the particle confinement may be worse or better in the peripheral plasma region of these period, respectively. Even now any evidence on good/bad energy confinement during ICRF discharges, there might be the possibility of the change of the RF accessibility due to the non-linear heating effect by ICRF. This issue should be treated carefully due to the effect of the uncontrollable recycling. The increment and decrement of the ion saturation current were apparently proportional to the net ICRF power. By FFT analysis the frequency peak of 90-100kHz was found in the ion saturation current during ICRF#2. This peak was recognized clearly with the decrease of the ion saturation current. These phenomena should be solved in the near future.

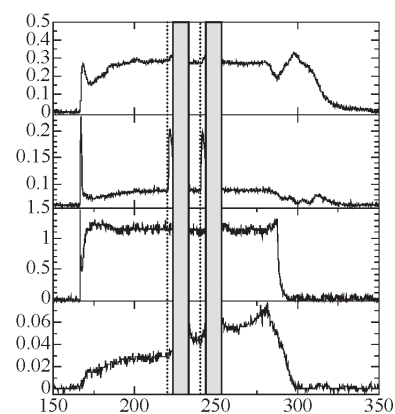


Fig.1 Typical waveform of plasma parameters