§30. High-energy Proton Tail Formation at R_{ax} = 3.6 m and 3.75 m

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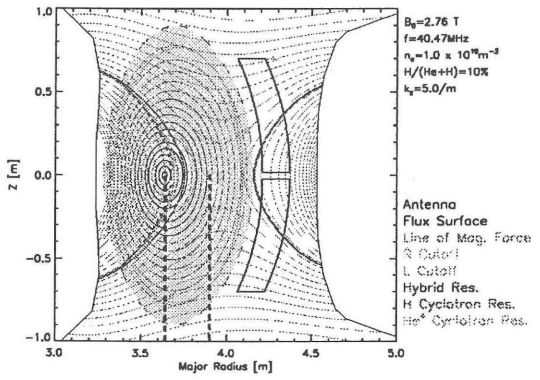
It has been experimentally shown that excellent energy confinement property is obtained in the inward shifted configuration (R_{ax} = 3.6 m), in spite of the enhanced magnetic hill structure compared with that of the standard configuration (R_{ax} = 3.75 m). This is mainly considered due to improvement of neoclassical transport and high-energy particle confinement.

Fast ion behavior have been studied by measuring the high energy neutral particle spectra during minority ICRF heating [1], and their relaxation after the ICRF termination [2], by using natural diamond detectors [1]. The measurements of the 1999 campaign show that acceleration and slowing down of perpendicular particles behaved classically, and the orbit loss was not observed

(a) R_{ax} = 3.6 m



(b) R_{ax} = 3.75 m

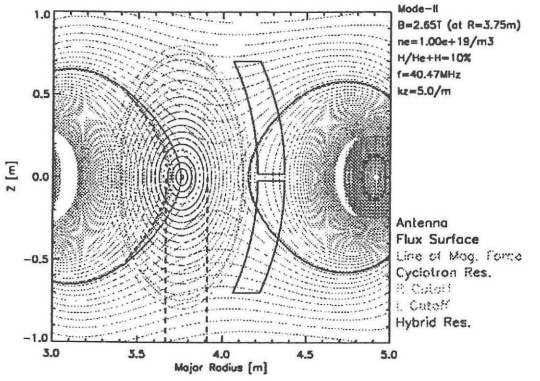


Fig. 1. Poloidal cross sections of LHD magnetic closed surfaces at R_{ax} = 3.6 m (a) and R_{ax} = 3.75 m (b), together with cyclotron resonance surfaces of 38.47 MHz and 40.47 MHz. Dashed lines show two vertical observation chords.

in the inward shifted configuration (R_{ax} = 3.6 m) in the density range of $n_e < 10^{19}/m^3$.

In the 4th campaign, two vertical observation chords were prepared, one at R ≃ 3.65 m and one at R ≃ 3.9 m as shown in Fig. 1. ICRF of 38.47MHz (1.8-2.3s) and 40 MHz (2.8-3.3s) was applied to an NBI-sustained plasma. In Fig. 2 are shown the time evolution of high-energy proton temperature. Stix parameter dependence of the central chord shows little difference between two cases (R_{ax} = 3.6m, 3.75 m), but some differences were seen in the outer chord spectra, showing the orbit effect.

Reference

[1] A. V. Krasilnikov, M. Sasao, M. Isobe, et al., submitted to Nuclea Fusion(2001).

[2] M.Sasao, S.Murakami, M.Isobe, A.V.Krasilnikov, et.al. 18 IAEA Fusion Energy Conf. (Sorento, October 2000), IAEA-CN-77/EX9/1

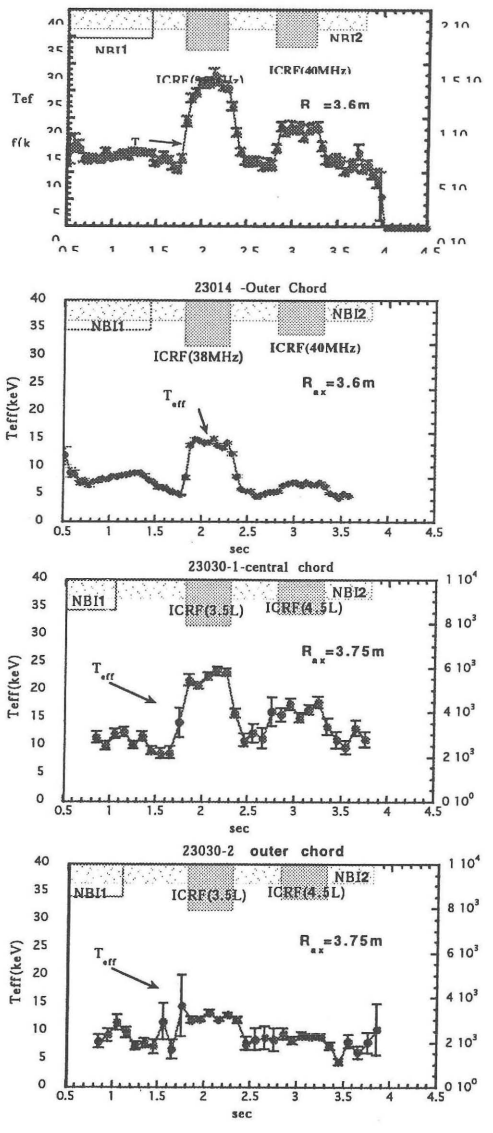


Fig. 2 Time evolution of T_{eff} at R_{ax} = 3.6 m (upper two) and 3.75 m (lower two).