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For high power ICRF heating, five half-turn antennas were designed and installed in CHS. Four antennas with narrow width (~4cm) current strap were installed in slant ports (P-ports) and the other one with a wide width (~16cm) current strap was installed in a vertically elongated position (U-port). Standard magnetic configuration for ICRF heating was B_t = 1.7T / R_{ax} = 92.1cm. Total radiated RF power was about 0.75 MW, and its frequency was 26MHz.

Suppression of a radiation loss from impurities is a key issue for ICRF heating. To achieve this, Faraday Screen (FS) and the current conductor were carefully designed to keep a certain distance[1]. For wall and antennas' surface conditioning, boronization with decaborane ($B_{10}H_{14}$) was carried out frequently. As a result, the radiation loss from oxygen was reduced by more than 2 times.

Working gas was a pure deuterium or a mixed gas of hydrogen as a minority in deuterium with various mixture ratios. Its ratio was monitored by the visible spectroscopy because it was greatly influenced by the wall recycling.

The RF power was applied to the afterglow plasma of ECH or to the NBI heated plasma. In the case of ECH afterglow target, the plasma of 3-4x10^{13}cm^{-3} / 2kJ was sustained for 40msec (till the end of the RF pulse) by all antennas with 600kW radiated power at around 1.7T. The electron temperature on the magnetic axis measured with the Thomson scattering was 200eV. Two component ion energy spectrum was obtained with the Neutral Particle energy Analyzer (NPA). The bulk ion temperature was close to that of the electron (200eV) in usual case. High ion temperature of 550eV with 600kW of RF power was observed in different experimental condition. The increase in the stored energy of 800J was achieved for the combined heating with NBI (600kW) when the RF power of 450kW was applied to the NBI initiated plasma with 3kJ at the averaged electron density of 2.5x10^{13}cm^{-3}.

heated plasma except for a high T_i discharges was 50-70 % of NBI heated plasmas'. In the case of the high Ti plasmas, the confinement characteristic was comparable to that of NBI heated plasma and close to the LHD scaling[2].

Figure 1 (a) and (b) show the dependence of the plasma stored energy and the line averaged electron density on the magnetic field strength B_t for the P-port antennas and for the U-port antenna, respectively. These figures show that both type of antenna have similar dependence on the B_t.

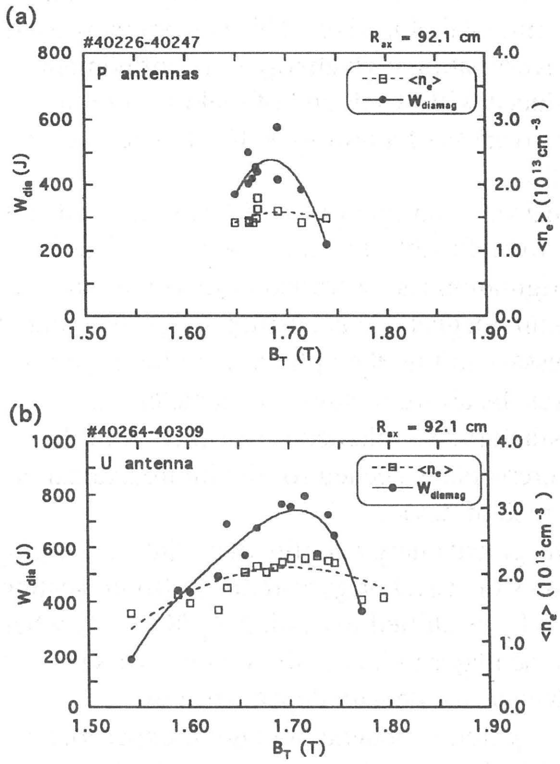

Fig. 1. Dependence of the plasma stored energy and the line averaged electron density on the magnetic field strength B_t.
(a) for the P-port antenna,
(b) for the U-port antennas.

Reference

1) K. Nishimura, et al., Annual Report of NIFS Apr.1992-Mar.1993 (1994) 166.
2) K. Nishimura, et al., 15th IAEA Conf., Seville, 1994 (IAEA, Vienna, 1994) IAEA-CN-60 /A-6-I-4.