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EX/P6-25: Recent Results from Ion Cyclotron Resonance Heating Experiments in HT-7 and EAST Tokamak

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Recent ICRF heating experiment in HT-7 and EAST tokamak devices is given. Experimental results in HT-7 show efficient ion and electron heating have been achieved. In the mode conversion case, direct ion heating by the mode converted ion Bernstein waves (MC IBW) was observed. Experimental evidence and numerical simulation show that the interaction between the MC IBW and 7 Li ions at the first ion cyclotron harmonic resonance of 7 Li is the main mechanism for rf power deposition. In the EAST tokamak, the RF heating is found to depend strongly on plasma preheating. In combination with LHW, the ICRF heating efficiency is even higher than the one of ICRF only. With 1.0 MW of ICRF power injected at a line-averaged electron density of $4.0 \times 10^{19} \text{ m}^{-3}$, the electron temperature increases from 1.0 keV to above 2.0 keV and the loop voltage drops. An increase of the stored energy by 30 kJ was obtained. Density pump-out was observed during L-mode discharges at a high electron density of $4.0 \times 10^{19} \text{ m}^{-3}$. In these discharges, re-attachment of the plasma was observed when ICRF power was applied. Combined operation of ICRF and LH at EAST often resulted in a degradation of the LH wave coupling due to RF sheaths induced local density modification by ICRF antenna. The potential measurements with two Langmuir probes confirmed the presence of an enhanced sheath with ICRF when the probe is connected to the active antenna. Moreover, the modification of plasma potential dependence on antenna phase, RF power and plasma-antenna distance was observed.

Country or International Organization of Primary Author

China

Collaboration (if applicable, e.g., International Tokamak Physics Activities)

ICRF system and experiments

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