



IAEA FEC 2014

Contribution ID: 558

Type: Poster

High Power ICRF Systems and Heating Experiments in EAST

Wednesday 15 October 2014 08:30 (4 hours)

The ICRF system of 12.0 MW has been developed for EAST. To support the long pulse operation over 1000s, the ICRF heating system is upgraded with active cooling, especially for ICRF antenna systems. The ICRF system of 6.0MW has been operating in the 2012 experimental campaign. A new 6.0 MW system has been successfully commissioned at full power on water dummy load. In the upcoming campaign, the ICRF system is capable of delivering more than 10 MW of rf power to the plasma. The relevant experimental results from the upcoming campaign will be given.

Heating power modulation experiments using ion cyclotron resonance heating (ICRH) in the Hydrogen minority scheme have been performed in the 2012 campaign of the EAST. The power deposition profile in the ion cyclotron range of frequencies (ICRF) has been investigated experimentally. The D (H) minority heating scheme provides a dominant localized ion heating. In this scheme, electron heating occurs only through collisions with the minority ion tail. The results shows that the peak of the experimental power deposition profile is always occurred around to $\omega=\omega_{cH}$. The global energy confinement time was calculated in the ICRF modulation experiment, and compared with the scaling law, ITER-89. It was found that the calculated results coincided with ITER scaling law. The global energy confinement time decreases by a factor of 2 approximately from that in Ohmic plasmas with the ICRF heating power increases up to 1.6 MW. The heating efficiency was somewhat lower than expected. The effect on the sawtooth period was demonstrated in the experiments analyzed in this paper.

Country or International Organisation

China

Paper Number

EX/P3-3

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Session Classification: Poster 3