

Enhanced ICRF Heating of H-mode Plasmas in KSTAR

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Enhanced ICRF (Ion Cyclotron Range of Frequency) ion heating of H-mode D(H) plasma will be tried in 2011 KSTAR experimental campaign. Minority heating is a main ion heating scheme in the ICRF. Its efficiency increases as the hydrogen minority ratio increases in deuterium plasmas. And it should be sustained at a lower level than the critical minority ratio. Consequently, it is important to elevate the critical ratio to maximize ion heating and it is possible by increasing the ion temperature or parallel wave number (k_{\parallel}) of the antenna. Increasing the k_{\parallel} is not a good approach since the coupling efficiency decreases exponentially with regard to k_{\parallel} as well. So the remaining method is to increase ion temperature by using NB (Neutral Beam). Ion heating fraction of NB increases as the electron temperature increases. Therefore, we will try to heat electron by using ECH together with NB ion heating before ICRF power injection. The ICRF heating efficiency will be compared with respect to several NB+ECH+ICRF heating combinations through several diagnostics such as XICS (Xray Imaging Crystal Spectroscopy), CES (Charge Exchange Spectroscopy) and neutron measurement. The theoretical background and the experimental results will be presented in more detail in the conference.

Keywords: ICRF, KSTAR, minority heating, NB, ECH