

Investigation of Electron Heating Effect in NB-injected FRC

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Recent results of neutral beam (NB) injection experiments on the FIX-FRC device are presented. The NBI is considered as an attractive candidate for FRC sustainment, such as plasma current drive, heating and fueling. Previously performed NBI experiment on the FIX device proved that the NBI worked to improve the FRC confinement significantly [1]. A probable mechanism for this improvement will be the electron heating caused by NBI [2].

To investigate the mechanism of beam-plasma interaction, measurement of the FRC plasma parameter is essential, and especially the electron temperature measurement is required to understand the heating effect and the mechanism of confinement improvement. For this purpose, we have constructed the YAG Thomson scattering measurement system that provides spatial multipoint analysis.

Experimental results have shown that the NB-injected FRC plasma had relatively higher electron temperature in comparison with the FRC without NB. This higher electron temperature resulted in the longer flux and plasma volume lifetimes remarkably observed in the earlier period of the FRC discharge in the FIX confinement region. Detailed evaluation will be presented at the workshop.

[1] T. Asai, et al., Phys. Plasmas, 7, 2294 (2000).

[2] T. Asai, et al., J. Plasma and Fusion Res., 77, 1230 (2001).

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