Dependence of electron cyclotron driven current on magnetic field configuration of CHS

Y. Yoshimura, T. Akiyama, M. Isobe, A. Shimizu, C. Suzuki, C. Takahashi, K. Nagaoka, S. Nishimura, T. Minami, K. Matsuoka, S. Okamura, CHS group
S. Kubo, T. Shimozuma, H. Igami, T. Notake, T. Mutoh

National Institute for Fusion Science, Toki, Japan
yoshimura.yasuo@lhd.nifs.ac.jp

Electron Cyclotron Current Drive (ECCD) experiments have been carried out using 53.2 GHz EC wave at 2nd harmonic condition on CHS. So far, driven current up to 6 kA has been achieved when bootstrap current of plasmas sustained by ECH is less than 2 kA. The direction of driven current by obliquely injected EC wave is determined by the direction of EC wave, not affected by a reversal of magnetic field direction while the bootstrap current changes its direction by the reversal. The direction of the driven current can be explained by linear ECCD theory in the case of low field side injection.

Dependences of driven current on the EC wave beam direction, polarization of the beam, position of magnetic axis and strength of magnetic field are investigated to clarify the mechanism of ECCD on CHS. So far, combining the changes of magnetic field direction, EC-beam direction and polarization, it is confirmed that an efficient way for ECCD is the combinations which result in a right-hand polarization. Also, density dependence such as the driven current decreases with density in 1/ne manner, and the existence of optimum toroidal injection angle have been investigated.

In this presentation, dependence of electron cyclotron driven current on magnetic field configuration will be introduced. The amounts of driven current in opposite directions show asymmetry and the manner of asymmetry varies with the position of magnetic axis. According to the results of magnetic axis and magnetic field scanning experiment where the EC wave beam is obliquely injected aiming at each magnetic axis, it is suggested that the complicated 3-dimensional magnetic field structure of helical systems affects the efficiency of ECCD.