Estimation of the current driven by residual loop voltage in LHCD Plasma on EAST Tokamak

X.M. Zhang¹, L.M. Yu¹, B.N. Wan², E. B. Xue¹, Y. Fang¹, K.Y. Shi¹, and EAST Team²

1. Department of Physics, East China University of Science and Technology, P.O. Box 385, Shanghai 200237, People’s Republic of China
2. Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, 230031, People’s Republic of China

Email: zhangxm@ecust.edu.cn and Yulimin@ecust.edu.cn

The lower hybrid wave current drive (LHCD) is one of the efficient methods of driving the non-inductive current required for Tokamak operating in steady-state. Residual loop voltage exists in tokamak when it is not fully non-inductive driven current. Residual loop voltage also accelerates the fast electrons generated by lower hybrid wave (LHW), which can drive extra current and combine to the current driven by LHW. It is generally difficult to separate these two different components of driven current on the experiment. In this paper, the currents driven by LHCD and residual loop voltage are separated directly by solving the Fokker-Plank equation numerically. Fraction of the current driven by residual loop voltage to the current driven by LHW is evaluated on Experimental Advanced Superconducting Tokamak (EAST) in this paper. It is about several percent to the LHCD when the residual loop voltage is small, but it increases with the residual loop voltage, it is up to 25% when the residual loop voltage is about 2V. This contribution should not be omitted for evaluating LHCD efficiency when the residual loop voltage is not zero in experiments, especially when it is a little bit high. The hot electrical conductivity is also deduced from the net current driven by residual loop voltage. Its distribution profile is related with the fast electron distribution driven by LHW.