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Improved heating efficiency of ECH near cut off density with a new injection scheme in the LHD MASAKI NISHIURA, S. KUBO, Y. YOSHIMURA, R. YANAI, S. ITO, H. IGAMI, T. II TSUJIMURA, T. SHIMOZUMA, H. TAKAHASHI, N. KENMOCHI, National Institute for Fusion Science — We proposed a new electron cyclotron heating (ECH) system from a high field side injection in the Large Helical Device (LHD). High reliable and functional ECH system enhances plasma parameters, and performs the wide variety of physics experiments. The new method is an injection of EC beam perpendicular to the magnetic fields from an outer coil case on the vertically elongated plasma shape of the LHD. The heating efficiency for 77 GHz EC wave with both O-mode and X-mode is evaluated by the ray trace calculation of TRAVIS code. We found that the new injection scheme keeps the high heating efficiency up to the cut off density for the O-mode by reducing the beam refraction, compared with the conventional ECH. In the case for the X-mode with the same launching position, the oblique injection maintains the high heating efficiency in the electron density from $2 \times 10^{19} \text{ m}^{-3}$ to $1 \times 10^{20} \text{ m}^{-3}$. The density regime exceeds the cut off density of 77 GHz. The details of the new method will be presented.

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