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Experimental Study of MHD mode rotation in the Edge Plasmas of the Large Helical Device Y. TAKEMURA, S. SAKAKIBARA, K.Y. WATANABE, K. IDA, S. OHDACHI, Y. SUZUKI, Y. NARUSHIMA, I. YAMADA, K. NARIHARA, K. TANAKA, T. TOKUZAWA, H. YAMADA — The relationship between MHD mode rotation and the plasma flow has been investigated on Large Helical Device (LHD). Several MHD modes excited in edge region of plasma have been dominantly observed in high-beta regime. Especially, the modes in the stochastic layer are key instabilities for degradation of high beta plasma and/or the formation of the edge transport barrier. In order to understand the mechanism of MHD mode rotation, the electron density scan experiment was performed to widely change the radial electric field and poloidal flow. Experiments indicate the following results: MHD modes rotate in the electron diamagnetic direction with several kHz in the laboratory frame and the frequencies gradually decrease with the density. Poloidal plasma flow is dominant at objective resonances because toroidal flow is almost zero there. With respect to modes inside last closed flux surface (LCFS), the mode frequency in the plasma frame is quantitatively consistent with the electron diamagnetic drift frequency within the measurement error, which means that the observed modes rotate with the electron fluid. The frequency of the mode outside LCFS seems to be much closer to the ion diamagnetic drift frequency than to the electron one.

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