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Generation of Azimuthal Plasma Rotation due to Ion Stream Line Detachment in a Diverging Magnetic Field Region KENICHIRO TERASAKA, Kyushu University, SHINJI YOSHIMURA, National Institute for Fusion Science, MITSUTOSHI ARAMAKI, Nagoya University, HIROTSUGU KATANAMI, MASAYOSHI Y. TANAKA, Kyushu University — Flow structure of ions in a diverging magnetic field has been experimentally studied in a steady-state electron cyclotron resonance plasma. We have measured the ion flow velocity using a directional Langmuir probe calibrated by the laser induced fluorescence (LIF) spectroscopy. A weakly diverging magnetic field configuration was adopted in the experiment, where the ions are accelerated from subsonic to near sonic speeds by the ambipolar electric field along the magnetic field line. It was found that the ion stream line detachment takes place in a diverging magnetic field region, when the non-adiabaticity parameter of ions becomes order of unity. In the detachment region, the generation of plasma rotation due to the $\boldsymbol{E} \times \boldsymbol{B}$ drift has also been found. The radial electric field is generated by the difference of motions between the magnetized electrons and the unmagnetized ions. The generation of azimuthal rotation implies that the electromagnetic angular momentum is important as well as the mechanical angular momentum in the detachment region, where the ion stream line is different from the magnetic field line.

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