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Azimuthal ExB drift of electrons induced by the radial electric field flowing through a longitudinal magnetic channel with non-magnetized ions HIROSHI AKATSUKA, JUN TAKEDA, ATSUSHI NEZU, Tokyo Institute of Technology — To examine of the effect of the radial electric field on the azimuthal electron motion under $E \times B$ field for plasmas with magnetized electrons and non-magnetized ions, an experimental study is conducted by a stationary plasma flow. The argon plasma flow is generated by a DC arc generator under atmospheric pressure, followed by a cw expansion into a rarefied gas-wind tunnel with a uniform magnetic field ~ 0.16 T. Inside one of the magnets, we set a ring electrode to apply the radial electric field. We applied an up-down probe for the analysis of the electron motion, where one of the tips is also used as a Langmuir probe to measure electron temperature, density and the space potential. We found that the order of the radial electric field is about several hundred V/m, which should be caused by the difference in the magnetization between electrons and ions. Electron saturation current indicates the existence of the $E \times B$ rotation of electrons, whose order is about $2000 - 4000$ m/s. The order of the observed electron drift velocity is consistent with the theoretical value calculated from the applied magnetic field and the measured electric field deduced from the space potential.

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