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Electron drift across the magnetic field in a micro-ECR neutralizer YOSHINORI TAKAO, KENTA HIRAMOTO, Yokohama National University, YUICHI NAKAGAWA, HIROYUKI KOIZUMI, KIMIYA KOMURASAKI, The University of Tokyo — Although neutralization is required for ion propulsion systems to produce thrust by ion beams in space, a neutralizer itself should be low-power and low-propellant consumption because electrons make no thrust. To design such a micro neutralizer, the mechanisms of electron transport should be elucidated. In the present study, three-dimensional particle-in-cell simulations have been conducted for a 4.2-GHz microwave discharge neutralizer, using an electron cyclotron resonance xenon plasma. The size of the discharge chamber is $20 \times 20 \times 4$ mm^3 and a plate with four orifices is placed at the downstream of the chamber. The calculations were performed at the gas pressure of 1 mTorr and the absorbed power of 0.3 W. The simulation results have indicated that the electrostatic field inside the plasma source has a dominant effect on the electron extraction. When the electrons are trapped in the magnetic field passing close to the orifice, such electrons can be extracted from the plasma source to the outside at the orifice edge because of the $\mathbf{E}\times\mathbf{B}$ drift. The $\mathbf{E}\times\mathbf{B}$ drift also seems to play a significant role in electron transport from the ECR layer to the orifice plate across the magnetic field.

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