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Electron Extraction Mechanisms of a Micro ECR Neutralizer¹ YOSHINORI TAKAO, KENTA HIRAMOTO, Yokohama National University, YUICHI NAKAGAWA, YUSUKE KASAGI, HIROYUKI KOIZUMI, KIMIYA KO-MURASAKI, The University of Tokyo — A neutralizer is one of the indispensable components for ion propulsion systems. To design a better performance neutralizer the mechanisms of electron extraction from its plasma source through orifices should be elucidated. In the present study, three-dimensional particle simulations have been carried out for a 4.2-GHz microwave discharge neutralizer, where the size of the discharge chamber is $20 \times 20 \times 4 \text{ mm}^3$ and a xenon electron cyclotron resonance plasma is employed. The numerical model is composed of a particle-incell simulation with a Monte Carlo collision algorithm for the kinetics of charged particles, a finite-difference time-domain method for the electromagnetic fields of microwaves, and a finite element analysis for the magnetostatic fields of permanent magnets. The calculations were conducted at the gas pressure of 1 mTorr and the absorbed power of 0.3 W. The simulation results have indicated that the electrostatic field of the plasma has a dominant influence on the electron extraction, where electrons are not extracted unless the effect of the electrostatic field is taken into account in the calculations.

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