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Particle Simulation of a Micro ICP Plasma Source for Miniature Ion Thruster YOSHINORI TAKAO, KOJI ERIGUCHI, KOUICH ONO, Department of Aeronautics and Astronautics, Kyoto University — There has recently been an ongoing trend toward decreasing the mass, dimension, and overall complexity of spacecraft. Propulsion systems are no exception. We have developed an electrothermal-type microthruster so far, which can produce a relatively high thrust, and have investigated the thrust performance with an experimental and numerical approach. On the other hand, a microthruster with a high specific impulse, such as ion thruster, is also required. The micro ion thruster presented here uses a cylindrical micro ICP with a flat spiral coil for its ion source, the inner radius and the length of which are 3 mm and 6 mm, respectively. To investigate the plasma characteristics of the source, we have developed a particle simulation model (PIC/MC: Particle-in-Cell/Monte Carlo) for Ar gas as a propellant. The simulation results showed that the electron density obtained was $\sim 10^{17}$ m^{-3} at an Ar gas pressure of 4 mTorr with an absorbed power of 10 mW, producing a thrust of 50 μN and specific impulse of 7000 s.

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