

Abstract Submitted
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Fluid Modeling of Microwave Plasma under an External Magnetic Field¹ MASAYUKI TAKAHASHI, NAOFUMI OHNISHI, Tohoku University
— A dense plasma is ignited when an intense microwave is focused on using focusing devices, which is utilized in a microwave rocket system. A thrust performance of the microwave rocket was measured by flight demonstration, which indicated that its thrust performance drastically decreased with a decrease in an ambient pressure. Takahashi and Ohnishi numerically described that speeding up in the plasma propagation and a decrease in the energy absorption caused the performance degradation in the microwave rocket. Applying an external magnetic field into the rocket nozzle was proposed to improve the thrust performance by confining the plasma inside the rocket nozzle and enhancing a shock wave. However, a multi-dimensional dynamics of the microwave plasma under the magnetic field was not examined in the previous studies. In this study, a plasma fluid model is developed to capture the multi-dimensional plasma transport during the microwave irradiation when the magnetic field is applied to the discharge domain. The discharge pattern obtained by the fluid model is compared with that reproduced by a particle model to check a validity of the fluid model developed by us.

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