

Development of a double stage electrostatic accelerated RF plasma thruster

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Research and Development activities on electric propulsions (EPs) are currently very active because it will be a key component to achieve future space missions such as manned interstellar missions or deep space projects [1]. As one of examples, an MPD thruster [2] is under development for the purpose of a manned lunar mission around 2030. As other cases, ion engines and Hall thrusters [3] have already been employed for an attitude control or an orbit rising of satellites. To realize various space missions, high performance EPs with large thrust and high specific impulse are required.

In this study, a novel electrostatically accelerated plasma thruster is developed. This thruster is categorized as a double stage EPs that separate the plasma production and the acceleration area. Plasma is ignited by RF discharge via a MOSFET based inverter power supply in the production area, and then, accelerated by an induced electric field between an anode and a cathode in the acceleration area. In a series of experiments, the thruster is operated with nearly 5 kW with argon propellant and evaluated its performance through various diagnoses. In addition to thruster performance, basic plasma characteristics such as plasma parameters and ion energy distribution

function are measured. As results of measurements, as designed, it is verified that plasma is electrostatically accelerated, and that thrust can be controlled by applied voltages. Details of the thruster structure, and the obtained thruster features will be discussed in the presentation.

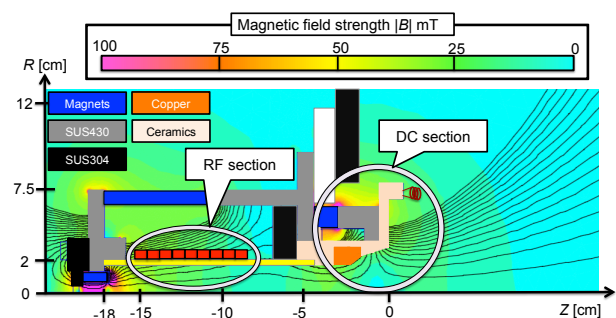


Fig.1. Schematic of a newly developed double stage electrostatic accelerated RF plasma thruster

References

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