

SPACE PROPULSION SYMPOSIUM (C4)  
Interactive Presentations (IP)

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EVALUATION OF QUASI-STEADY OPERATION OF MPD THRUSTER USING ELECTRIC  
DOUBLE-LAYER CAPACITORS**Abstract**

In recent years, electric propulsion machines are running with more power. It is necessary to increase thrust to accommodate a wide range of missions. Actually JAXA aims to operate the hall thruster 10 kW class in a few years. The Magneto-Plasma-Dynamics (MPD) thruster is one of the leading candidates for the next high power electric propulsion machine. Ultimately, steady operation at 100 kW to 1 MW is desired, but due to restrictions on experimental equipment, short-time operation of several ms is called quasi-steady state operation and the steady state performance is evaluated. However, the main current power supply currently has full time discharge of about 1 ms with a small time constant. In this case, the discharge waveform collapses and it can not be said that electric power can be stably supplied. Therefore, we developed a power supply unit that can supply high power stably by using electric double layer capacitor as power source. It became possible to lengthen the stable discharge time and trim it variably using IGBT. We tried quasi-stationary operation of the MPD thruster by replacing the discharge power supply from PFN with this new power supply. As a result, we confirmed the operation by stable discharge. Also, we dealt with the collapse of the waveform in the magnetic field by adjusting the gas supply timing. Finally, the operation time characteristic of the propulsion performance was obtained by operating with gradually changing the discharge time from 0.3 ms to 3.0 ms. As a conclusion, the performance showed a constant value regardless of the discharge time and confirmed quasi-steady operation.