1. Background

1.1 What is LA-PPT

Laser Propulsion + Pulsed Plasma Thruster

Laser-Assisted Pulsed Plasma Thruster

- Simple and compact systems
- Various materials can be used for propellant
- Significant thrust controllability
- High ISP or Thrust characteristics

1.2 Research motivation

■ Performance of Short pulse cases ⇒ ?

- Specific impulse increase with charge energy
- The highest specific impulse of 7200

1.3 Objective

1. To confirm advantages of high-voltage operation
2. To confirm high-peak power operation & to reduce thermal loss to thruster

⇒ Examination of high-voltage, short-pulse operation

2. Experimental setup

2.1 Experimental device

2.2 Impulse bit measurement

To measure an impulse bit of a short-pulse LA-PPT, the impulse bit measurement was conducted using a cylindrical target thrust stand shown schematically.

2.3 Mass shot measurement

To the mass shot measurement, the amount of mass loss was calculated using a confocal laser microscope (KEYENCE.VK-X200). A typical number of pulse shots for the measurement was 2000.

3. Result

In this study, to verify the thrust performance of laser-assisted pulsed plasma thruster in ablation with low laser energy of 50 mJ and 100 mJ and establish for the optimum operate condition, an impulse bit measurement and mass shot measurement were conducted. The results of the experiments will be presented in the following sections.

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1. Laser beam irradiated on solid propellant
2. Plasma accelerated through laser ablation
3. Electric discharge current flows through Plasma
4. Magnetic field induced by discharge current
5. Plasma accelerated by Lorenz Force

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