

Introduction

Symposium 2: Trends in Basic Research and Development of Advanced Plasma Thrusters

趣旨説明 はじめに

シンポジウム2：先進的プラズマスラスト実現へ向けての基礎開発研究の動向

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In this symposium, eight presentations on activities regarding research and development effort of advanced plasma thrusters are given. It is hoped that the symposium leads to enhanced interactions between researchers working on electric (or plasma) thrusters and those of various other plasma science and engineering fields.

1. Background

Plasma thrusters, which utilize ionized gas (or plasma) as a propellant, are expected to play a major role in deep-space as well as orbital missions because of their high efficiency, inherently high exhaust velocities that lead to a high fuel efficiency, and precise thrust control capabilities. In fact, ion and Hall thrusters are already in use in various space missions. Especially, the ion thrusters ($\mu 10$) developed by JAXA have dramatically demonstrated remarkable capabilities of plasma thrusters in a successful asteroid sample return mission by the "Hayabusa" spacecraft.

However, further advancement of plasma thrusters in order to improve some of their critical characteristics, such as lifetime and total performance efficiency, is definitely needed so as to further increase their versatility.

This symposium is organized in order to introduce some of the basic research and development activities on advanced plasma thrusters to plasma scientists and engineers in general.

2. List of Presentations

The symposium consists of eight main presentations. The titles and presenters (in parentheses) are listed below.

1. Space Exploration Strategy with High Power Plasma Propulsions (K. Kinofuchi)

2. Challenge to Erosion-less Hall Thrusters (K. Komurasaki)

3. Radio Frequency Plasma Cathode for High-Power Ion and Hall Thrusters (H. Watanabe)

4. Development of Ion Engines for "HAYABUSA2" Spacecraft (K. Nishiyama)

5. Small Current – High Voltage Steady-state Operation of MPD Arcjet (D. Ichihara)

6. Physical Mechanism of a Plasma Thruster Utilizing a Magnetic Nozzle (A. Ando)

7. Research on Completely Electrodeless Electric Thrusters Using High-Density Helicon Plasmas – the HEAT Project and Related Topics (S. Shinohara)

8. Modeling of Helicon Plasma Production and Plasma Acceleration (T. Hada)

Besides these lectures, an introductory talk at the beginning of the symposium will be given by Tanikawa, and a summary talk at the end of the symposium will be given by Muranaka.

3. Concluding Remarks

It is hoped that the symposium leads to enhanced interactions between researchers working on electric (or plasma) thrusters and those of various other plasma science and engineering fields.

Finally, we note that the subject areas covered in this symposium are apparently not exhaustive. Many other R & D activities of various advanced plasma thruster concepts are left untouched.