1. Introduction

Problem of conventional electric thrusters

- Direct contact between plasma and electrodes
  - Problem of short discharge due to the erosion of electrodes
- Due to the problem, the following are necessary
  - Low gas ions in thruster internal area
  - High neutral particle density

Solution

- Rotating magnetic field (RMF) acceleration
  - RMF: Rotation of magnetic field using two pairs of opposing coils
  - RMF: 

2. Concept & objective

Helicon Electronically Advanced Thruster (HEAT)

- High density (~10^19 m^-3)
- High temperature (~10,000 K)
- Wide range of applied fields, pressures, and powers

3. Experimental device

Large Mirror Device (LMD) - RF mirror plasma acceleration

4. Proposed Helicon thruster

- IFT: Internal gas feeding (IFT)
  - Conventional one: Gas feeding tube (ceramic) is used.
  - IFT: Gas feeding tube (ceramic) is used.

5. Gas feeding schemes

- Present status of development of our helicon plasma thruster

6. Internal gas feeding (IFT) (continued)

- High pressure range in a localized region
- Gas feeding tube (ceramic) is used.
- Damage of IFT may occur.

7. LIF measurement (for IFT discharge)

- In IFT case, ion velocities are slower than conventional one.
- Both IFT and conventional method, direction of ion velocities showed rotation from field line.
- Due to the high neutral particle density.

8. Supersonic gas puffing (SSGP) (continued)

- Using two pairs of opposing coils with RMF current frequency ω (Ar) in the range (2-5) x f Donetsk's law

9. Rotating magnetic field acceleration

10. m = 0 coil acceleration (17, 18)

11. Spectral measurement

- Quite small diameter plasma
- High density and high temperature plasma
- Difficult to probe electron density & temperature

12. Spectral image reconstruction using high-speed camera

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