



Contribution ID: 30

Type: Oral Presentation

Non-Specialist Lecture: Optimization of the PEGASES plasma thruster

Thursday, 10 July 2014 14:00 (40 minutes)

**Abstract content
 (Max 300 words)
Formatting &
Special chars**

The PEGASES plasma thruster (Plasma propulsion with Electronegative GASES) is a new gridded ion engine which generates thrust by alternatively accelerating both positive and negative ions; no electrons are present in the ion beam plume, and no separate neutralizer is needed. A radio-frequency antenna in the source region of the thruster is used to ionize the injected gas and form a high density plasma, the main negatively charged species of which are electrons. A magnetic filter placed just downstream of the source then strongly cools the electrons, allowing them to attach to the gas to form negative ions. In this way an almost electron-free plasma (known as an ion-ion plasma) is produced just in-front of the thruster extraction/acceleration grids.

Vital to the functioning of the thruster is the ability to be able to alternatively extract both positive and negative ions by a set of biased grids; a process that has been found to unexpectedly depend on the upstream plasma properties near the antenna, and in particular, on the choice of wall materials for the plasma source region. By performing a detailed experimental investigation of the thruster, we show that the use of conducting or insulating wall materials completely changes the nature of the plasma diffusion phenomena (i.e. ambipolar or nonambipolar) in the source, and we demonstrate how this can be used to optimize the plasma production and extraction of charged particles through the grids into the acceleration region.

**Apply to be
 considered for a student
 award (Yes / No)?**

No

**Level for award
 (Hons, MSc,
 PhD)?**

NA

**Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?**

No

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Session Classification: Applied

Track Classification: Track F - Applied Physics