
Ref. PROMETEO-EP2-T1: Characterization of magnetically shielded Hall-effect thrusters

Description and objectives:

Magnetic confinement aims at inhibiting plasma transport to the walls, which produces energy losses and erosion of material, reducing efficiencies and thruster lifespan. Energy losses can increase largely by secondary electron emission (SEE) of ceramic materials. The main open problems are three. First, the search for optimal topologies in magnetically-shielded (MS) Hall effect thrusters (HET). Second, the characteristic behavior of the wall material in terms of SEE and sputtering. Third, the characterization of the electron velocity distribution functions (VDF) in the usual conditions of weak-collisionality. Research will be built upon former results within EP2.

The activity of the candidate will be organized in the following tasks: Mastering of existing simulation capabilities for this topic at EP2; Development of a radial-axial kinetic simulator for a simplified MS-HET configuration; Extension to a complete MS-HET simulator; Derivation of approximate fluid plasma-wall interaction model for use in fluid codes.

Specific Requirements:

- Excellent academic record. Strong background in the following fields will be appreciated:
 - Applied Mathematics
 - Scientific Programming (preferably in python, Fortran)
 - Fluid Mechanics
 - Plasma Physics
- Have completed 300 ECTS of university courses and meet the conditions to apply to an UC3M PhD program in 2019.
- Good skills in: team & independent working; critical & creative thinking; initiative & proactiveness; communication of scientific results
- Good proficiency in English (oral & written)
- Availability to travel abroad (e.g. conferences and research internships)

Expected output:

A minimum of two JCR research journals and two communications at relevant international conferences are expected as output of this PhD. International collaboration with other groups and a PhD internship of minimum three months abroad in a prestigious university/research center will be actively promoted.