Call for applications for a PhD position

Laboratory of Excellence PLAS@PAR

Title of the PhD project: Micro-discharges in confined media: fundamental processes and application to lightning interaction with matter

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**Project description (Context and objectives of the project, possibly with 2-3 references)**

Plasma discharges confined in very small volumes (µm-mm) are of crucial importance for many applications. At Onera, in unit FPA (Foudre Plasmas et Applications), experimental and numerical studies have revealed the very important role played by confined micro-discharges in many phenomena involved in lightning strokes on aircrafts [1-4]:

- Breakdown of insulating materials subject to high electric-fields.
- Non-linear behaviour of electrical contacts between conductive materials under high current.
- Phase transitions of matter from solid state to plasma state under intense Joule heating.

These phenomena are critical in the aerospace industry for maintenance and safety considerations [5]. Then, current lightning stroke models need to be improved in order to model such micro-discharges and consecutive damages [6].

In this context, the PhD student will have to:

- Explore different modelling strategies concerning discharge propagation in dense media and the breakdown of micro-gaps, relevant to the lightning interaction with aeronautic materials.
- Implement models in the 3D MHD lightning code of the department and perform validation test-cases.
- Participate in the definition of campaigns on the lightning facility GRIFON for comparison and experimental validation.
- Study numerically the impact of micro-discharges on the current distributions and the failure modes in complex aerospace structures and materials subject to lightning strokes (composite/porous materials, T-joint structures…) [5-6].


Requirements for the candidate

The candidate should have a master degree in engineering or physics with a specialization in at least one of those fields:

- Plasma physics
- Electromagnetism
- Fluid-dynamics
- Energetics

The candidate should also have a first experience in modelling and numerical simulations, and have a good writing and speaking level in English.

Location and starting date

The PhD. would take place in ONERA Châtillon:
Office National d’Etudes et de Recherches Aérospatiales
29 Avenue de la Division Leclerc
92320, Châtillon.

The desired starting date is between the 1st of March 2016 and the 1st of April 2016.

The application should be sent by e-mail to the following contacts:

fabien.tholin@onera.fr
anne.bourdon@lpp.polytechnique.fr

Applications with CV, statement of motivation, copies of degree diplomas and grades, two reference letters, and copies of any previous research-related work. Deadline is May 31st 2016.