

Research Fellowship in High Power Analysis

Directorate of Technical and Quality Management

ESTEC, Noordwijk, The Netherlands

ESA/RF-ESTEC(2015)014

Overview of the Division's mission

The RF Systems, Payload and Technology Division is part of Electrical Engineering Department and of Technical and Quality and Management Directorate.

The RF Systems, Payload and Technology Division is responsible for space instrumentation and end to end communication systems, subsystems, equipment and technologies which cover the following domains:

- Communication systems and subsystems design and validation;
- Commercial ground and user segment products for navigation, telecommunications and remote sensing;
- Systems for TT&C communication, navigation, remote sensing and scientific applications;
- Satellite payloads (e.g. repeaters for telecommunications or navigation instruments, earth remote sensing instruments for scientific applications);
- Microwave and millimetre wave equipment and technologies;
- Complex on-board payloads for communications and remote sensing, and processing core of such systems, including optically based implementations;
- Systems testing for performance evaluation or validation;
- Laboratories to test/proof concepts soundness and validation.

The Division consists of five sections and the divisional laboratory unit. They are:

- 1) Telecommunication - TT&C systems and techniques
- 2) Radio Frequency Equipment and Technology Section
- 3) Payload engineering
- 4) Radio navigation systems and techniques
- 5) Commercial Ground and User Segment Products
- 6) Laboratory

Overview of the field of research proposed

The ultimate goal of this research is to generate rules and recommendations to improve the RF breakdown prediction for realistic transmission signal cases and, hence, to adjust the RF designs to the power requirements. Additionally, these rules and recommendations will help to define the ECSS related to multipactor (ECSS-E-20-01A).

The main objectives of the investigation are:

- To investigate the theory used for the RF breakdown prediction. This theoretical approach will be the tool to identify the worst case.
- To use the theory to characterize the breakdown behavior in other cases (not only the worst case).
- To define and support a high power test campaign and correlate the results with the predictions.

Additionally, the work will be carried out closely together with the ESA High power RF laboratory (ESA-VSC Laboratory in Valencia, Spain). Lately, the laboratory has procured a new facility oriented to test multipactor breakdown for multicarrier and/or modulated signals. This new facility will become essential for the aim of this work since it is possible to perform test with enough accuracy to correlate results with simulations.

Successful candidates will perform research in high power breakdown phenomena and will, in particular, carry out the following tasks:

- Study of the state of the art for RF breakdown (including multicarrier and modulated signals).
- Study theoretically the physics involved in RF breakdown.
- Extend the previous study to arbitrary signals.
- Define and develop suitable software tools for RF breakdown prediction for arbitrary signals.
- Design adequate RF breadboards for multipactor test with arbitrary signals.
- Perform power handling analysis for the designed breadboards.
- Define and perform high power test at the ESA-VSC Laboratory. It will be required to travel to Valencia for short-medium periods of time to perform the tests.
- Propose research strategies to deal with the targeted topic.

Who can apply

The programme is open to suitably qualified women and men. Preference will be given to applications submitted by candidates within five years of receiving their PhD.

The Research Fellow Programme is open to nationals of the following states: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the UK, or Canada as a Cooperating State, Bulgaria, Estonia, Hungary, Latvia, Slovakia and Slovenia as European Cooperating States (ECS).

Required qualifications

Applicants must have recently completed their PhD studies in Physics, Electronic Engineering or equivalent.

The candidate should have previous experience in the design of RF hardware and the use of design tools such as HFSS, CST, FEM, MICIAN, etc. Experience in the assembly and testing of RF hardware will be highly beneficial.

Applicants should have good analytical and communication skills and should be able to work in a multi-cultural environment in an autonomous manner.

Applicants must be fluent in English and/or French, the working languages of the Agency. A good proficiency in English is required.

How to Apply

Please fill in the [online](#) application form attaching to it, **in one document only**, your CV, your motivation letter and your research proposal.

Candidates must also arrange for up to **three letters of reference** to be sent by e-mail, before the deadline, to **temp.htr@esa.int**. The letters must be sent by the referees themselves. The candidate's name must be mentioned in the subject of the email.

Applications satisfying the general conditions for eligibility, to be submitted **by 6 May 2015**, will be evaluated and successful applicants will be invited for an interview.

Interested candidates are highly encouraged to visit the ESA website: www.esa.int.