

Job Title: Internal Research Fellow (Postdoc) in Spacecraft "Design for Demise"

Requisition ID 11941 - Posted 18/12/2020



EUROPEAN SPACE AGENCY

Research Fellowship Opportunity in the Directorate of Technology, Engineering and Quality.

ESA is an equal opportunity employer, committed to achieving diversity within the workforce and creating an inclusive working environment. For this purpose, we welcome applications from all qualified candidates irrespective of gender, sexual orientation, ethnicity, beliefs, age, disability or other characteristics. Applications from women are encouraged.

Post

Post

Internal Research Fellow (Postdoc) in Spacecraft "Design for Demise"

This post is classified F2.

Location

ESTEC, Noordwijk, The Netherlands

Description

The **Propulsion and Aerothermodynamics Division (TEC-MP)** is responsible for:

- support to projects and definition/execution of technology programmes in the areas of chemical propulsion (systems utilising liquid, solid, hybrid and gaseous propellants for spacecraft and launch vehicles), electric propulsion (electrostatic, electromagnetic, and electrothermal systems), advanced new propulsion systems (e.g. air-breathing engines for advanced launch vehicles and applications of nuclear propulsion to space missions), external and internal aerothermodynamics of relevance to propulsion systems, ascent, cruise and re-entry of space vehicles through the Earth's or planetary atmospheres;
- architecture and technology assessment of new space transportation vehicles for Earth orbit, exploration and orbital systems applications;
- development of components for propulsion systems (valves, regulators, tanks, GSE, etc.);
- development of propulsion and aerothermodynamics simulation tools and support to the evolution of the related European test facilities.

The **Flight Vehicles and Aerothermodynamics Engineering Section (TEC-MPA)** is responsible for:

- flight vehicle engineering;
- computational fluid dynamics;
- ground testing, and ground-to-flight transposition methods for internal and external flows;
- external and internal aerothermodynamics of relevance to propulsion systems;
- ascent, cruise and re-entry of space vehicles through the Earth's or planetary atmospheres;
- plume analysis;
- multi-physics modelling;
- fluid-structure interaction phenomena;
- exploitation of flight data from flight experiments, especially involving aerothermodynamics and (re-)entry.

Field of activities/research

Spacecraft "Design for Demise" or D4D is currently the solution proposed at system design level to ensure compliance with the risk requirement where there is uncontrolled Earth entry from space. To minimise risk to the human population, the requirement for spacecraft re-entry is a casualty risk below 10⁻⁴. Compliance can be achieved by performing controlled de-orbit, but the mass and cost impact can be high. An alternative is to ensure passive, safe re-entry within a 25-year timeframe using D4D techniques and technologies.

The proposed programme of work is for 12 months and has the following objectives:

- Objective 1: Survey the current state of the art of Design for Demise as applied to non-space industrial processes (buildings, transportation, manufacturing) as well as space missions. The related fields of research should include aerodynamics, thermodynamics, propulsion, structures and materials. The research will comprise a survey of the non-space sector versus space mission design. For the space part, special attention should be paid to the technology activities already initiated in TEC in the D4D area and ESA mission needs.
- Objective 2: Based on ESA mission needs, investigate and assess new, efficient, and cost-effective D4D methods involving innovative materials, structures and aerodynamic shapes. This objective will take into account the upcoming new complex ESA

missions when uncontrolled re-entry may be required. This objective will also cover the investigation and benchmarking of demisability problems and solutions.

- Objective 3: Design, develop and run a series of simulations for ESA missions where demisability will be used to safely re-enter a spacecraft, launch stage, or dead satellite. Development of the simulations will be performed using the existing TEC tools and incorporating the required new techniques and technologies such as to maximise efficiency and minimise running time.
- Objective 4: Propose a comprehensive plan to test, verify, and validate the simulations developed using the ESTEC Testing Facilities and laboratories.

Technical competencies

Ability to conduct research autonomously
Breadth of exposure coming from past and/or current research/activities
Research/publication record
Knowledge relevant to the field of research
General interest in space and space research
Ability to gather and share relevant information

Behavioural competencies

Innovation & Creativity
Continuous Learning
Relationship Management
Self Motivation
Communication
Problem Solving
Cross-Cultural Sensitivity

Education

You should have recently completed, or be close to completion of, a PhD in mathematics, spacecraft engineering, or physics. Preference will be given to candidates awarded their doctorate within the last five years. The working languages of the Agency are English and French. A good knowledge of one of these is required. Knowledge of another Member State language would be an asset.

Other information

For behavioural competencies expected from ESA staff in general, please refer to the [ESA Competency Framework](#).

The Agency may require applicants to undergo selection tests.

The closing date for applications is 22 January 2021.

In addition to your CV and your motivation letter, please add your proposal of no more than 5 pages outlining your proposed research in the "additional documents" field of the "application information" section.

At the Agency we value diversity and we welcome people with disabilities. Whenever possible, we seek to accommodate individuals with disabilities by providing the necessary support at the workplace. The Human Resources Department can also provide assistance during the recruitment process. If you would like to discuss this further please contact us at contact.human.resources@esa.int.

Please note that applications are only considered from nationals of one of the following States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. Nationals from Latvia and Slovenia, as Associate Member States, or Canada as a Cooperating State, can apply as well as those from Bulgaria, Cyprus, Lithuania and Slovakia as European Cooperating States (ECS).

Priority will first be given to candidates from under-represented Member States.

In accordance with the European Space Agency's security procedures and as part of the selection process, successful candidates will be required to undergo basic screening before appointment