

# Job Title: Internal Research Fellow (PostDoc) in Design for Demise

Req ID 8362 - Posted 17/01/2019



## 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. Applications from women are encouraged.

### Post

#### Internal Research Fellow (PostDoc) in Design for Demise

This post is classified F2 on the Coordinated Organisations' salary scale.

### Location

ESTEC, Noordwijk, The Netherlands

### Description

Within the Propulsion and Aerothermodynamics Division, the Flight Vehicles and Aerothermodynamics Engineering Section 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 also through the Earth's or planetary atmospheres;
- plume analysis;
- multi physics modelling;
- fluid-structure interaction phenomena;
- exploitation of flight data from flight experiments, specially involving aerothermodynamics and (re-)entry.

### Field(s) of activities/research

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

The following programme of work is proposed:

- Objective 1: Survey the current state of the art in the fields related to D4D applied in non-space industrial processes (e.g. buildings, transportation, manufacturing) as well as in space missions. The related fields of research shall cover aerodynamics, thermodynamics, propulsion, structures and materials. The research will comprise a survey of the non-space sector versus the design of space missions. Special attention shall be paid to activities already ongoing in the Directorate in the field of D4D, as well as to ESA mission needs.
- Objective 2: Based on ESA mission needs, investigate and assess new, efficient and cost-effective methods for D4D by means of innovative materials, structures and aerodynamic shapes. This objective will take into account any new upcoming ESA missions where un-controlled re-entry may be required or imposed. This objective will also cover the investigation and benchmarking of the problems and solutions of demisability.
- 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. The simulations will be developed using the Directorate's

existing tools and in a way so as to maximize efficiency and minimize running time.

- Objective 4: Propose a comprehensive plan to test, verify and validate the simulations developed using the ESTEC Testing Facilities and the ESTEC 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  
Self Motivation  
Communication  
Problem Solving  
Relationship Management  
Cross-Cultural Sensitivity

## Education

Applicants should have recently completed, or be close to completion of a PhD in aerospace engineering, physics or mathematics. Preference will be given to applications submitted by candidates within five years of receiving their PhD.

## Additional requirements

The Research Fellow must be able to work in a team with other international investigators in a spirit of positive co-operation and, at the same time, be capable of working autonomously in his/her area of research. At the end of the fellowship, the Research Fellow will be required to summarize the work completed in papers to be submitted to specialized conferences/journals.

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 07 February 2019.

In addition to your CV and your motivation letter, please add your proposal of no more than 5 pages outlining your proposed research. Candidates must also arrange for three letters of reference to be sent by e-mail, before the deadline, to [temp.htr@esa.int](mailto: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.

If you require support with your application due to a disability, please email [contact.human.resources@esa.int](mailto:contact.human.resources@esa.int).

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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, the United Kingdom and Canada and Slovenia as well as Bulgaria, Cyprus, Latvia, Lithuania, 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