Marie Sklodowska-Curie Early Stage Researcher

Department	Mechanical and Aerospace Engineering (www.strath.ac.uk/mae/)		
Faculty	Faculty of Engineering (www.strath.ac.uk/engineering/)		
Staff Category	Research	Reference No	187001
Reports To	Head of Department through Prof M. Vasile	Grade:	N/A - MC Fellowship
Salary Range:	Circa £39,811 - £41,678 per annum including allowances*	Contract Type:	Fixed Term (36 months)
FTE	1 (full-time)	Closing Date	30/04/2019

Job Advert

Within the STARDUST-R Marie Curie Research Training Network, a Marie Sklodowska-Curie Early Stage Researcher position is available for a fixed term period of three years to work on a project entitled "Multi-fidelity demise and survivability modelling of complex re-entry objects.". This work relates to the development of methods and tools for the design and uncertainty quantification of space objects that are due to completely demise during re-entry. The work associated to this post will investigate both the physics of the re-entry process, including possible fragmentations, and the required computational tools to estimate the footprint of the fragments and the probability of a ground impact. The successful applicant will work in a multi-disciplinary team with members of the Department and their partners in the STARDUST-R Marie Sklodowska-Curie Research Training Network. For further information on STARDUST-R, please see http://www.stardust-network.eu/

Applicants will be required to meet the Marie Sklodowska-Curie Early Stage Researcher eligibility criteria. In particular, at the time of appointment they should be within the first four years of their research career, have not been awarded a doctoral degree, and should not have resided in the host country for more than 12 months in the last three years immediately before the appointment. Researchers are normally required to undertake trans-national mobility (i.e. move from one country to another) when taking up the appointment. For a more detailed summary of the eligibility criteria see http://www.stardust-network.eu/

*The successful candidate will receive a financial package consisting of a living allowance, a family allowance (where applicable) and a mobility allowance, according to the rules for Early Stage Researchers (ESRs). The minimum annual salary will be approximately £39,811 per annum.

Job Description

Brief Outline of Job:

On average, over the past decade, a space object above 800 kg has been re-entering every week, e.g. ESA's GOCE in 2013, NASA's UARS in 2011, and Chinese Tiangong-1 in 2018. Most of these objects do not totally demise during the atmospheric re-entry. Fragments may survive and reach the ground where they pose a risk to people and things. Space agencies are currently enforcing constraints on the casualty risk for the re-entry event and different re-entry analysis tools have been developed by agencies, industries and research centres to assess this risk. At the same time, new approaches to the design of spacecraft, aimed at increasing the probability of complete demise during re-entry, offer an effective way to meet these constraints. Thus re-entry analyses approaches have to be embedded into the design process since the very beginning, to evaluate the demise probability and casualty risk of different configurations. Currently, most of the efforts are focused on structural design for demise techniques, the improvement of high fidelity and low fidelity models used to predict the aero-thermal performance and thermo-mechanical

response of objects, the implementation of efficient uncertainty quantification techniques for a more correct characterisation of the risks, and better understanding and modelling of material properties. Moreover, since demisability competes against the survivability of the object during its mission lifetime, design for demise can be seen as a multi-criteria and multidisciplinary design problem.

This position will focus on the combination of computational intelligence techniques with rigorous mathematical modelling for the treatment of design problems affected by uncertainties to support Planetary Defence. The major tasks will consist in the development and implementation of uncertainty based multi-fidelity and multidisciplinary approaches for the effective and efficient prediction of re-entry demisability and in-orbit survivability performance. Multi-fidelity methods will include high-fidelity approaches (e.g. DSMC or CFD for the aerothermodynamic part) as well as the formulation and implementation of low-fidelity methods capable to provide an optimal trade-off between computational complexity and level of accuracy and consistency with the physics. Multi-disciplinary will refer to the necessity to account for various concurrent physical processes (e.g. aerodynamics, thermal, structural, 6-dof body dynamics, etc.).

Main Activities/Responsibilities:

1.	Develop (i.e. formulate and implement) low and high fidelity models for demise and survivability prediction;
2.	Investigate innovative techniques for aero-thermal and thermo-structural analysis not yet applied to re-entry analysis (e.g. coupled multi-fidelity multi-physics for aerothermodynamics and peridynamics);
3.	Formulate and implement multi-fidelity approaches for the effective and efficient assessment of demisability and survivability of complex objects, where complexity is due to shape, as well as different materials used;
4.	Incorporate uncertainties on models, object properties and operational conditions to properly quantify/characterise demisability and survivability.
5.	Plan and manage own workload in order to conduct research both independently and collaboratively per project requirements, refining the work programme as necessary in conjunction with the supervisor. This will involve regular communication with other project researchers in the Network.
6.	Produce regular project reports and present these at project meetings.
7.	Disseminate research results though journal and conference papers.
8.	Develop and implement outreach activities.
9.	Attend training events and complete training activities organised by the Stardust-R network.
10.	Engage with the scientific community and collaborate with other scholars within and outside the Stardust-R network.

Person Specification

Educational and/or Professional Qualifications

(E=Essential, i.e. a candidate must meet all essential criteria to be considered for selection, D=Desirable)

E1	Good honours degree
E2	MEng, MSc (or equivalent professional experience) in mechanical or aerospace engineering, applied mathematics, or applied physics.

Experience

E3	Experience in development, implementation and use of numerical methods and algorithms for analysis and design
E4	Research experience in numerical Aero-Thermodynamic analysis
E5	Research experience in numerical thermo-structural analysis
E6	Research experience in Computational Intelligence
D1	Research experience in Uncertainty Quantification and Propagation
D2	Research experience in Artificial Intelligence
D3	Experience with the design, implementation, deployment and maintenance of software systems using appropriate software engineering methods

Job Related Skills and Achievements

E7	Computer programming ability in C++/Matlab/ Python in a Linux environment

E8	Ability to disseminate research output
D4	Ability to engage with the general public and stakeholders
E9	Ability to plan and organise own workload effectively
E10	Excellent interpersonal and communication skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences (it is essential that the researcher is able to produce reports on results/deliver presentations in English).
Personal Attributes	
E11	Ability to work both independently and as part of a team
E12	Confident with enthusiasm for the project
Other Relevant Factors	
E13	Meets Marie Curie Eligibility Criteria: In particular, at the time of appointment applicants should be within the first four years of research career, not been awarded a doctoral degree and should not have resided in the host country for more than 12 months in the last three years immediately before the appointment.

Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted before interview without permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter as a single document detailing the knowledge, skills and experience you think make you the right candidate for the job together with copies of transcripts and certificates in English and two reference letters. A template CV is available from http://www.stardust-network.eu/about/jobs/. Applicants should confirm within their covering letter the length of time they have resided in the host country in the last three years before 1 October 2019. Applicants should also complete the Equal Opportunities Monitoring Form.

Other Information

Further information on the application process and working at Strathclyde can be found on our website (http://www.strath.ac.uk/hr/workforus).

Informal enquiries about the post can be directed to Prof Massimiliano Vasile, Department of Mechanical and Aerospace Engineering (info@Stardust-R.eu / 0141 548 2326).

Rewards and Benefits

Our staff have access to a wide range of outstanding benefits that include financial rewards, family friendly and wellbeing benefits and career development opportunities, details of which can be found here.

Conditions of Employment

Conditions of employment relating to the Research staff category can be found at: Conditions of Employment

Probation

Where applicable, the successful applicant will be required to serve a 9 month probationary period.

Pension

The successful applicant will be eligible to join the Universities' Superannuation Scheme. Further information regarding this scheme is available from Payroll and Pensions.

Relocation

Relocation expenses are covered via the Fellowship's mobility allowance.

Interviews

Formal interviews for this post will be held on 31/05/2019.

Equality and Diversity

We value diversity and welcome applications from all sections of the community.

The University currently holds a Bronze Athena SWAN award, recognising our commitment to advancing women's careers in science, technology, engineering, maths and medicine (STEMM) employment in academia.

University Values

The University's Values capture what we're all about: who we are, what we believe in and what we stand for. Our Values have been derived from how we act and how we expect to be treated as part of Strathclyde.