European Commission

Doctoral position
"ESR 9 – Optimisation of hybrid ice protection systems based on coatings and electromechanical actuators"

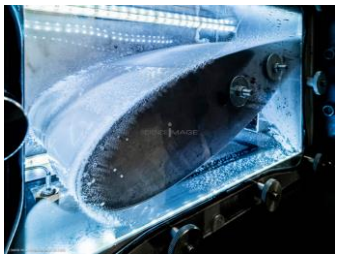
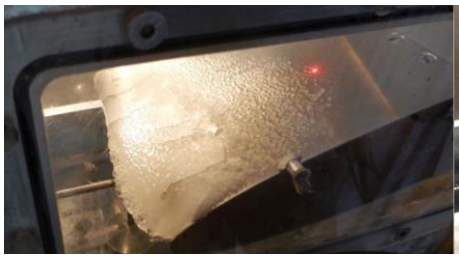
A 36-month doctoral position as an early-stage researcher (ESR) focused on the optimisation of hybrid ice protections system based on coatings and electromechanical actuators is proposed within the framework of a **Marie Skłodowska - Curie Innovative Training Network** (MSCA-ITN) project "Smart surface design for efficient ice protection and control" (SURFICE), a project under the European Union's Horizon 2020 research and innovation programme.

The candidate is required to be graduated of a Master's degree (or equivalent) in Engineering or Materials Science. Experience in finite element analysis, topology optimisation, fracture propagation modelling and skills for performing experiments will be assessed for the selection of the candidate.

The project will be carried out at ISAE-SUPAERO in Toulouse, under the scientific supervision of Pr. Valerie Pommier-Budinger (https://personnel.isae-supaero.fr/valerie-pommier-budinger/). Secondments of 3-6 months at different MSCA-ITN partner institutions will be part of the project.

The ESR will be enrolled as doctoral Student of ISAE-SUPAERO, from which he/her shall obtain the PhD degree in Aerospace Engineering.

Job Description
The project concerns the design of low power ice protection systems integrating industrial constraints of the aeronautics sector (weight, consumption, fatigue and impact resistance). The subject is of interest to aircraft manufacturers and system suppliers since ice protection systems are the second power consumer among non-propulsive systems in medium-haul and long-haul aircraft. The results of the project can be extended to other sectors such as wind turbines.


The project will include different tasks:
Preliminary results

1. State of the art on de-icing mechanisms.
2. Measure of the critical energy release rate of different substrates (composite and metallic, bare and coated)

Theoretical developments

1. Investigation and modelling of initiation and propagation of cohesive and adhesive fractures in ice.
2. Analysis of de-icing mechanisms for: different types of ice (rime, glaze), composite and metallic substrates, different ice and substrates shapes, different coatings.
3. Development of a design methodology for hybrid ice protection system based on passive ice protection systems (coatings) and active ice protection systems (electromechanical systems). The foreseen methodology is based on fracture propagation models as well on topology optimisation to design simultaneously the ice protection systems and the substrate to achieve substantial gains.

Validation

1. Development of prototypes
2. Testing in an icing-wind tunnel and confrontation of experimental data with theoretical results.

A secondment at ANSYS in Canada is planned during the PhD programme. Plans are subject to change because of possible mobility reduction due to COVID-19 pandemic.

Your Profile

- Candidates should have recently obtained a Master's degree in Engineering or Materials Science with outstanding grades.
- Strong theoretical background in at least one of the following topics: Finite element analyses, topology optimisation, fracture propagation.
- Strong abilities to perform and analyse experimental campaign.
- Desirable: experience in design and setup of an experimental test-rig.
- Language skills: ENGLISH: Excellent; FRENCH for the interaction within the University, however not required.

Institution address

Institut Supérieur de l'Aéronautique et de l'Espace, ISAE-SUPAERO, 10, avenue Édouard-Belin, 31055 Toulouse, France

Dates

Expected starting of the working contract: 01.06.2021 or by agreement. We look forward to receiving your application until 31st March 2021.

Application process

By e-mail to valerie.budinger@isae-supaero.fr and recruitment@surfice-itn.eu, including the recruitment form and others documents given on the website: https://www.surfice-itn.eu/

This website also gives the ELIGIBILITY CRITERIA, the application requirements and the selection process.

For questions and further information on the position, please contact Prof. Valerie Budinger.