Technische Universität Braunschweig

Institut für Flugzeugbau und Leichtbau IFL

SE²A

PhD-Researcher Position (m/f/d) within the SE²A Research Cluster

Energy-absorbing 3D-printed structures for bird strike-resistant laminar wing

Temporary Position (up to 3 years), up to Salary Level EG 13 TV-L, 100%

Background:

The Cluster of Excellence *SE²A - Sustainable and Energy-Efficient Aviation* is a DFG-funded interdisciplinary research center investigating technologies for a sustainable and eco-friendly air transport system. Scientists from aerospace, electrical, energy and chemical engineering as well as economics and social science are working on the reduction of drag, emissions and noise, life-cycle concepts for airframes, improvements in air traffic management and new technologies for energy storage and conversion. Technische Universität Braunschweig, the German Aerospace Center (DLR), Leibniz University Hannover (LUH), the Braunschweig University of Art (HBK) and the National Metrology Institute of Germany (PTB) have joined forces in this extraordinary scientific undertaking. The overall project is structured into the three core research areas "Assessment of the Air Transport System", "Flight Physics and Vehicle Systems" and "Energy Storage & Conversion". (www.tu-braunschweig.de/en/se2a)

The Project:

A key technology for sustainability and fuel savings in flight is the reduction of drag by keeping the flow laminar on the wing, which can be achieved by so-called HLFC concepts using suction. In a new research project in the Cluster of Excellence, the functionality of a suction system at the leading edge of the wing is to be combined with the necessary energy absorption capability for resistance against bird strikes. For this purpose, cellular TPMS structures (Triply periodic minimal surface) are to be used as a sandwich core under the wing skin, which are produced using additive manufacturing (3D printing) and enable suction through their open channels. The choice of material, geometry and possible grading of these structures should be optimized with regard to their energy absorption under highly dynamic impact loads from bird strikes, with the overall goal also being weight optimization. This collaborative research work is to be carried out with the help of experimental test campaigns for material characterization under static and high-rate dynamic loads and crushing and impact tests as well as with the help of numerical simulation and optimization methods.

Employment:

The position is located at the Institute of Aircraft Design and Lightweight Structures (https://www.tu-braunschweig.de/en/ifl) in Braunschweig. The entry date is as soon as possible, and the duration is initially limited until the end of 2025. The position is part-time suitable, but should be occupied 100%. For all doctoral researchers of the cluster, an active participation in SE²A's own qualification programme is mandatory, the time effort for this training measure entails 10% of the working time. The payment is made

according to task assignment and fulfillment of personal requirements up to salary group EG 13 TV-L. International applicants may have to successfully complete a visa process before hiring can take place. Applications from international scientist are welcome. The Cluster SE²A aims to increase the share of women in academic positions. Applications from female candidates are very welcome. Where candidates have equal qualifications, preference will be given to female applicants. Candidates with handicaps will be preferred if equally qualified. Please enclose a proof.

Task:

- Predesign of a wing leading edge in sandwich construction with TPMS core structure
- Simulation model creation and validation for numerical study and optimization of energy absorption of 3D printed TPMS structures
- Planning and implementation of experimental test campaigns for material characterization and dynamic crushing and impact loads on TPMS samples and wing structures including sample production (mainly 3D printing) and data analysis
- Publishing research results in scientific journals and at international conferences
- The position offers the opportunity to write a PhD thesis
- Support the Institute's teaching activities (supervision of lectures and student theses)
- Support research project acquisition and administrative tasks of the Institute.

Who we are looking for:

- You are enthusiastic about aircraft structures and lightweight materials and have in-depth knowledge of their failure behavior and calculation methods
- You have experience in the field of finite element methods, especially with Abaqus
- You are enthusiastic about experimental test campaigns and additive manufacturing processes
- You have a university degree in engineering with above-average grades
- You are a team player and independent, solution-oriented and structured
- You are proficient in the English language for work in an international research environment
- You are proficient in the German language to support the teaching activities of the institute.

Application Process:

Applications should be sent by e-mail to s.heimbs@tu-braunschweig.de or in printed form to

Technische Universität Braunschweig
Institut für Flugzeugbau und Leichtbau
Prof. Dr.-Ing. Sebastian Heimbs
Hermann-Blenk-Straße 35, D 38108 Braunschweig

until 30.11.2022 and must contain the following documents.

- Motivation Letter
- Curriculum Vitae including complete address, phone number, email address, educational background, language skills, and work experience

- Copies of bachelor and master diploma and transcript of grades in original language and in English or German translation
- Additional Documents must be provided on request

All documents should be in PDF format, preferably in a single file. Personal data and documents relating to the application process will be stored electronically.

Please note that application costs cannot be refunded. For the purpose of carrying out the application process, personal data will be stored.

For more information, please call Prof. Dr.-Ing. Sebastian Heimbs at +49 (0) 531 391-9903.