

We are hiring:

## Doctoral researcher / PhD student

in the subject area

### „AI-based optimisation of crash energy absorbers“

*(Temporary position (up to 3 years), up to salary level EG 13 TV-L, 100%)*

The Institute for Aircraft Design and Lightweight Structures (IFL) of Technische Universität Braunschweig researches lightweight materials, design and analysis methods for the sustainable aviation of tomorrow.

Aircraft fuselage structures must be designed for a variety of different loads, and crash is one of them. In fact, the fuselage structure typically involves special energy absorption concepts, especially in the lower area, in order to be able to maintain structural integrity and evacuatability in defined crash load cases required by airworthiness standards. A wide variety of crash absorber concepts have been developed over the last centuries, based on the plastic deformation of metal profiles, the crushing of fiber composite materials, the compression of cellular honeycomb or foam structures, or similar. In a new collaborative research project, optimised absorbers are now to be developed and experimentally validated on the basis of this existing data and knowledge. The use of data-based AI and machine learning methods is to be examined in order to develop the ideal weight-specific energy absorber. Both the creation of further necessary test data as well as demonstrations of the optimised absorber designs are to be carried out experimentally on a crash test device.



This work is done in direct cooperation with Airbus and other partners as part of a publicly funded European Clean Aviation research project.

#### Tasks:

- Extensive literature study on the subject of crash absorbers, generation of a database
- Development of optimisation approaches for crash absorbers from the multitude of different concepts using AI methods and numerical simulations with regard to weight-specific energy absorption
- Planning and implementation of experimental crash tests on fibre-reinforced composite, metal, hybrid or 3D printed absorber structures including manufacturing and data analysis
- Publishing research results in scientific journals and at international conferences
- Support of teaching
- Support in applying for research projects and in the self-administration of the Institute

#### Your profile:

- 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 data-based methods, AI methods, machine learning, optimisation, finite element methods
- You are enthusiastic about experimental test campaigns
- You have a university degree in engineering with above-average grades
- You are both 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.

#### The position:

- Location: Institute for Aircraft Design and Lightweight Structures (IFL) at the Airport Campus in Braunschweig

- Start date, duration: The position is to be filled from April 1st, 2023, initially for a limited period of 3 years with the possibility of an extension of up to a maximum of 6 years
- Payment depends on the assignment of tasks and the fulfillment of personal requirements up to salary group 13 TV-L
- The position is generally suitable for part-time work, but should be occupied 100% of the time
- There is the opportunity for a doctorate as part of a follow-up project.

### **Application:**

Applications should be sent by e-mail to **s.heimbs@tu-braunschweig.de** until 30.03.2023 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.

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Date: 09.03.2023  
Valid until: 30.03.2023

