Institut für Flugzeugbau und Leichtbau

IFL

SE²A

PhD-Researcher Position within the SE²A Research Cluster

Aerostructural optimization for preliminary aircraft design

Temporary Position (3 years), Salary Level TV-L E13, 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 engineering, economics, chemistry and biology 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/se2a)

Employment:

The position is located at the Institute of Aircraft Design and Lightweight Structures in Braunschweig. The entry date is May 1st 2020, and the duration is initially limited until the end of 2022. Depending on fulfilment of personal requirements, the remuneration is based on the salary level TV-L E13. International applicants may have to successfully complete a visa process before hiring can take place. We are an equal opportunity employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin, disability status, or any other characteristic protected by German law. TU Braunschweig aims to increase the share of women in academic positions. Applications from female candidates are explicitly encouraged. Where candidates have equal qualifications, preference will be given to female applicant. Besides, candidates with disabilities will be preferred if equally qualified.

Task:

The need for sustainable and energy efficient aviation, pushes the aviation industries toward the design of the next generation of transport aircraft, with dramatic reduction in energy consumption, emissions and noise. Based on the Flightpath 2050 the airplanes flying in 2050 should have 75% CO2 reduction per passenger-kilometer. To achieve this goal, new technologies as well as novel aircraft concepts need to be developed. Electric or hybrid electric aircraft, active flow control technologies, active load alleviation technologies, bionic airframes and novel aircraft configurations such as blended wing body are examples of the solutions suggested to achieve the mentioned goals for the design of future aircraft. Multidisciplinary design optimization (MDO) is recognized as one of the most promising methodologies

for the design of complex systems such as aircraft. Coupled-adjoint optimization is the most advanced and most recent development in MDO for aircraft design. The goal of this project is to develop a sophisticated aircraft design framework based on the state of the art coupled-adjoint MDO methods. This design framework will provide the means of simulating and optimizing the physical effects of novel technologies, such as electric and hybrid electric propulsion systems, on the aircraft performance. To achieve this goal, the available adjoint CFD and FEM codes are needed to couple for coupled-adjoint aerostructural optimization. For this purpose, proper interpolation methods need to be used for coupling the outputs of CFD and FEM. Besides, the interpolation methods need to be differentiated to generate the sensitivities of the coupled system analytically. The developed framework will be used for design optimization of three reference aircraft of the SE2A research project, i.e. a short range, a medium range and a long range (Blended Wing Body) aircraft.

Who we are looking for:

The requirements for this position are as follows:

- A Master of Science degree in aerospace engineering.
- Knowledge of multidisciplinary design optimization.
- Knowledge of computational fluid dynamics as well as finite element methods.
- Strong programming skills (Python and C++).
- Excellent communication skills in spoken and written English.
- Creativity, positive attitude, and perseverance.

Application Process:

Applications should be sent by e-mail to Prof.Dr. Ali Elham (a.elham@tu-braunschweig.de) 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 (and English translation if the original documents are not in English)
- Additional Documents must be provided on request

All documents should be in PDF format 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. The deadline for applications is Feb. 30st 2020.