Announcement of the position of research assistant (m/f/d, full-time) on
Wind-tunnel Experiments of Advanced Design of Swept-Wing with Suction Surfaces
(starting January 1st, 2023 – temporary position for three years)

Background
Environmental and economic concerns are key drivers toward the reduction of operational costs and greenhouse emissions to enable further growth of the commercial aviation sector. Especially the introduction of low drag wings and fuselages by extending the laminar region by passive or active flow control, e.g. natural laminar flow, NLF, or hybrid laminar flow control (HLFC), yields new opportunities to further reduce fuel consumption. The laminar boundary layer features lower shear stress at the surface, resulting in a reduction of viscous drag and thereby improving aerodynamic efficiency. For NLF this is achieved passively through surface shaping, for HLFC in addition to tailoring the shape for obtaining laminar flow, suction of the boundary layer is employed referred to as BLS. Laminar flow control has been active research for decades and in recent years a focus of the research community in Germany and Europe. Within the research activity of the Cluster of Excellence, SE²A, it has been shown that LFC technology has a significant potential to reduce the total drag of aircraft by extending the laminar region on the lifting surfaces and fuselage. Experimental research of LFC technology with suction insert has addressed flat-plate and unswept wings in current ongoing projects within the SE²A and provided a database for 2d flows. In practice, the wings for the medium and long-range are swept wings, and the related physics is more complicated. In addition to 2d Tollmien-Schlichting instabilities (TSI), Cross Flow (CF) and Attachment Line instabilities play an important role in the transitional flow regime. In addition, the flow has pressure distortion due to the fuselage conjunction, and the engine nacelle mounting on the wing results in 3d flows. However, a good quality database for such 3D transitional flows is not available. Therefore, this project “Wind tunnel experiments of advanced design of swept wing with suction surfaces” aims to fill this gap. The wing's advanced design includes an upper surface with suction inserts, and a lower surface designed with a generic 3D flow, resulting from nacelle interactions and fuselage junction, with the option to install a TE flap. The wing experiments will be performed in the DNW-NWB subsonic wind tunnel facility.

Task description
The announced position is located at the Institute of Fluid Mechanics of Technische Universität Braunschweig. This project is part of the research on physics of laminar flow and will contribute to the SE²A targets by providing unique experimental data needed for demonstrating the ability of comprehensive laminarization of swept wings of transport aircraft. This will take the ambition of the Cluster to enable drastic drag reduction of wings and empennage to the next level. The methods for this project are based on the knowledge base that has been acquired in the first stage of the SE²A research, including HLFC wing design, suction system design, and uncertainty quantification of the suction parameters and outcomes. The proposed swept wing will be manufactured from composite material with one or two exchangeable suction inserts. The experiments are planned to take place in the world-class wind tunnel DNW-NWB (Niedergeschwindigkeits-Windkanal Braunschweig) with a large test section of 3.25 m x 2.8 m x 8.0 m with wind speed up to 90 m/s, and Reynolds number up to 5.5 million. The measurement methods include static pressure measurements, infrared thermography for transition deduction, a wake rake for drag estimation, and a miniature traversable hot-wire mechanism for BL measurements.
The earliest start of the position is on January 1st, 2023. The position is initially limited to a period of three years. A subsequent employment for completing the PhD studies is possible. Depending on the assignment of tasks and fulfilment of personal requirements, the salary can be up to salary group 13 TV-L collective agreement. The position is generally suitable for part-time work, but we favour a 100% involvement.

The TU Braunschweig strives in all areas and positions to reduce under-representation. Therefore, applications from women are particularly welcome. Applications from people of all nationalities are welcome. Severely handicapped persons are preferred in case of equal suitability. Proof of eligibility must be submitted.

Application costs cannot be reimbursed. Please understand that applications that are not considered can only be returned against a self-addressed and sufficiently stamped envelope. Personal data will be stored for the purposes of the application process.
Application documents: 
Your application documents in English language (preferably submitted as a single combined pdf document) consisting of a cover letter (including your motivation), CV, academic performance record (grades during Bachelor and Master studies including grading scale details), proof of English language proficiency, and a copy of your Master's thesis or comparable student thesis.

Please send your application by **November 10th, 2022** via email or post to:

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If you have any further questions, please feel free to contact us via the above email address.

As part of the Aeronautics Research Centre Niedersachsen (NFL) our work is based on the following

**Mission statement**
We are a leading aerospace research centre in Germany, providing top level research and education. We create leading innovations in aerospace.

Scientific excellence and professionalism guide us in all that we do. Our research helps satisfy society’s need for mobility – both today and in the future. We focus on environmental sustainability, safety, and efficiency.

We direct the results of our research toward industry, science, and society. Our education is aimed at highly qualified engineers who are enthusiastic about aerospace.

Joining together the broad areas of expertise from the TU Braunschweig and the German Aerospace Centre gives us a particular appeal, along with international visibility.

Together we have all the skills needed to create technical innovations for aircraft and air transportation. These we develop with a holistic view toward of the system.

We offer the complete spectrum, from basic research to application-based technical development and testing. The results keep our education and training on the cutting edge.

The Campus Research Airport is building on an 80-year tradition of aeronautical research and flight testing in Braunschweig. We have an infrastructure that is unique internationally, with research aircraft, wind tunnels, simulators, and test facilities. Award-winning scientists and motivated students ensure top-level research.