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Thesis Opportunity in Aeroelasticity: Development of flexible aero-structural toolbox

Technische Universität München

TUM School of Engineering and Design
Chair of Aircraft Design

Motivation

As future transport aircraft continue to evolve, the trend toward high-aspect-ratio wings is becoming increasingly common, offering superior aerodynamic performance. However, these slender wings introduce significant structural flexibility, which must be considered at an early stage of the aircraft design process.

Traditionally, aeroelastic modeling—integrating both aerodynamic and structural models—requires significant manual effort and specialized expertise. This makes early-stage evaluation complex and time-consuming.

To address this challenge, the Chair of Aircraft Design has developed the Flexible Aero-Structural Toolbox (FAST). This in-house solution streamlines the aeroelastic evaluation process, significantly reducing the modeling effort and improving efficiency for designers and engineers.

The FAST tool has been developed and validated using an A320-like configuration. Continuous efforts have been made to further validate the tool with other configurations, such as the Ventus sailplane and the T-FLEX UAV. The tool is under constant development, with ongoing improvements focusing on enhanced modeling capabilities and robustness. The tool is now also capable of modeling hydrogen-powered aircraft and provides valuable insights into their aeroelastic behavior, supporting the development of sustainable, next-generation aviation concepts.
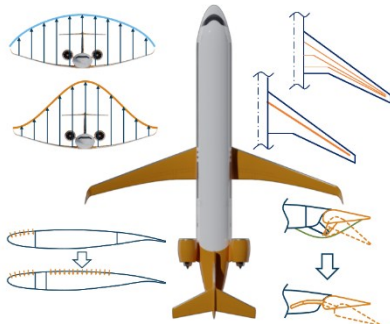
Topic

As the development of FAST is currently in a dynamic phase, the tool is being continuously improved and extended.

The specific tasks for this thesis will be defined in a preliminary meeting, taking into account individual interests, previous knowledge, and the requirements of ongoing projects.

Requirements

- Strong motivation for the topic
- Structured and independent way of working
- Experience in programming (e.g. Python)
- Good knowledge of aeroelasticity

Begin

As soon as possible

Supervisor

Fanglin Yu, M.Sc.
☏ (089) 289-15988
✉ fanglin.yu@tum.de