Institute for Rotorcraft & Vertical Flight

Automatized Aerodynamic & Aeroacoustic Propeller Optimization for Efficiency

(Simulation/Programming)

Keywords: **Propellers, Rotors, Structural Dynamics, Aerodynamics, Aeroacoustics, Flight physics, Aeromechanics, VTOL, UAV**

Background:

At the Institute for Rotorcraft & Vertical Flight, a new research group has been established, focusing on the dynamic behavior of propeller systems. The dynamic effects, well-known from classical helicopter systems, become increasingly significant as the size of propeller systems in the UAV/UAM market grows. Unlike traditional rotors, propellers typically lack flapping and lead-lag hinges, resulting in disproportionately large loads during forward flight for larger propellers. To manage these loads and vibrations, propellers must be designed with aeroelastic properties similar to rotor blades. The Dynamic Propeller Group is dedicated to achieve this goal and seeks support from motivated students to contribute to their innovative research efforts.

We offer: This thesis focuses on the automated optimization of propeller design, targeting aerodynamic and aeroacoustic efficiency. Utilizing advanced simulation techniques and programming, the research aims to enhance propeller performance. The study involves developing and implementing algorithms for optimizing propeller shapes, leveraging mid fidelity aerodynamic tools for aerodynamic analysis and acoustic simulations to assess noise levels. The outcome is expected to provide a comprehensive framework for designing high-efficiency propellers, contributing to advancements in aerospace engineering and sustainable aviation technology.

About us: We are a Team of PhD students looking for support from motivated Students (BA&MA). We work with our state-of-the-art research software and the institutes Rotor test rig. You are looking for interesting topics and want to work in the field of UAV/VTOL together with other Students sharing your interests? Feel free to contact us and send us a short motivational letter! We are looking forward to hear from you!

Skills: High motivation and the ability to independently familiarize with new topics. Programming skills in Python are an advantage

Tools: Python / Panel Methods / WopWop
Language: English/German
Start: now or later
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