



## **Aeroelastic Sensitivity Studies for Propellers using Multiphysic Codes**

(Simulation/Programming/Experimental)

**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 investigates the loads and vibrations on propellers as influenced by the elasticity of the blades, using multiphysic codes. The research aims to analyze the interaction between aerodynamic forces and structural elasticity in propeller blades, focusing on how these interactions affect loads and vibrations. By employing advanced multiphysics simulation tools, the study examines varying aerodynamic conditions and their impact on the structural integrity and performance of propellers. The work includes the development of models to predict aeroelastic behavior, validation through experimental data, and sensitivity analysis to identify critical parameters affecting performance. The findings are expected to enhance the design and optimization of propellers, ensuring improved efficiency, reliability, and safety in aerospace applications.

**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.

**Tools:** CAMRADII/Python

**Language:** English/German

**Start:** now or later

### **Contact:**

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