



Implementing and Testing Leading Edge Protection Options for Rotor- & Propellerblades (Theoretical/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: At the institute's existing rotor blade AREA, there is a pressing need for leading edge protection to enhance durability and performance. This thesis explores various potential solutions, with a focus on three identified options: polyurethane (PU) tape, metal sheet, and metal vapor deposition. Additionally, other potential solutions will also be investigated to ensure a comprehensive evaluation. The goal is to conduct a thorough comparison of all potential variants, including an analysis of costs, availability, and complexity, as well as the aerodynamic impact and effectiveness of each solution. The methodology will involve test rig investigations and abrasion tests to thoroughly evaluate the performance and suitability of each protection method.

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: Nastran(FEM)/Hypermesh/Python

Language: English/German

Start: from now

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