Semesterarbeit / Bachelor's Thesis / Master's Thesis / IDP

Institute for Rotorcraft and Vertical Flight

Development of a State-Space Freewake with Linearization

Background:

At the Chair of Rotorcraft and Vertical Flight, we investigate the fundamental physics of rotor wakes and their role in rotorcraft performance, stability, and aeroelastic behavior. Freewake models are among the most established approaches to capture the unsteady, nonlinear evolution of rotor tip vortices with high physical fidelity. Despite their accuracy, these models are inherently nonlinear, which complicates systematic analysis of stability, control, and coupling phenomena.

This thesis will focus on the development of a state-space formulation of a freewake model together with its linearization about representative operating conditions. Such a framework will enable formal stability investigations, system-theoretic analysis, and provide a basis for integrating wake dynamics into coupled aeroelastic and flight dynamics studies. The work lies at the intersection of vortex dynamics, numerical methods, and dynamical systems theory.

Requirements:

- Solid knowledge of C++ programming.
- Strong background in numerical methods (ODE solvers, discretization schemes, stability analysis).
- Background in aerodynamics or rotorcraft dynamics is advantageous but not mandatory.

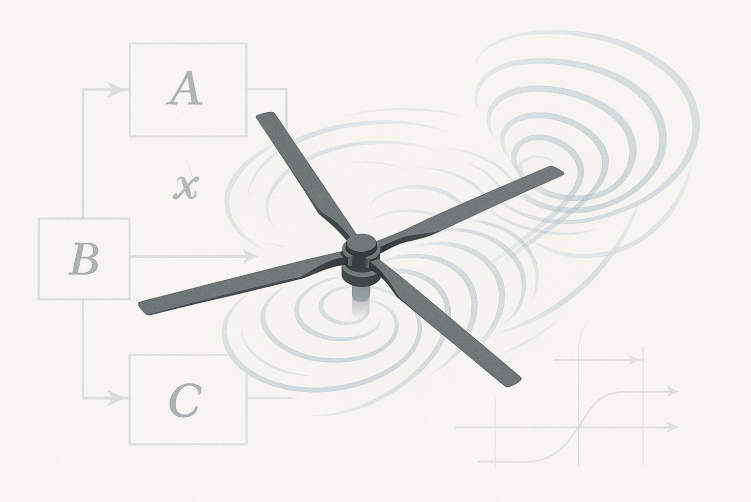
How to apply:

Interested? Please send the followings:

- A brief CV
- Transcript of Records

Start: As soon as possible

Language: English



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