Master Thesis - “Rotordynamic Stability Analysis of a High-Speed Aerospace Rotor” (30 credits/20 weeks – 1 student)

About us

GKN Aerospace is the world’s leading multi-technology tier 1 aerospace supplier. With 33 manufacturing locations in 12 countries, we serve over 90% of the world’s aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world’s advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

Project Background

Due to the extreme power generation requirements of jet engines, the turbomachinery operates at very high rotational speeds. Many rotors therefore operate in the supercritical regime, making rotordynamic behavior a key design consideration. One important aspect is rotordynamic stability, which describes the tendency of rotor whirl vibrations to grow due to destabilizing forces arising from complex phenomena such as fluid-structure interactions. While extensively studied, several destabilizing mechanisms remain only partially understood, particularly for aerospace applications.

The objectives of this thesis are to:

- Review the current understanding of destabilizing forces in high-speed turbomachinery.
- Investigate how these forces can be described mathematically and implemented in numerical rotordynamic models.
- Evaluate their influence on rotor stability by performing numerical analysis.
- Compare predictions with available test data where possible.

Assignment Description

The work will include:

- Literature study of rotordynamic stability and destabilizing forces.
- Programming and model development for stability analysis.
- Numerical analysis of representative rotor systems and parameter studies.
- Master’s thesis report and presentation of results.

Qualifications

The applicant should be

- Pursuing a master’s degree in Mechanical/Aerospace Engineering, Engineering Physics, Applied Mechanics, or related field.
- Interested in computational modeling of complex dynamic systems, rotordynamics, and propulsion
- Comfortable working with Python/MATLAB and ANSYS (APDL is a plus).
- Able to get security clearance (EU, EES, or US citizenship).

Apply by

Send your resume and cover letter to: Birgir Hermannsson, birgir.hermannsson@gknaerospace.com

Last date for application: 2026-12-14.