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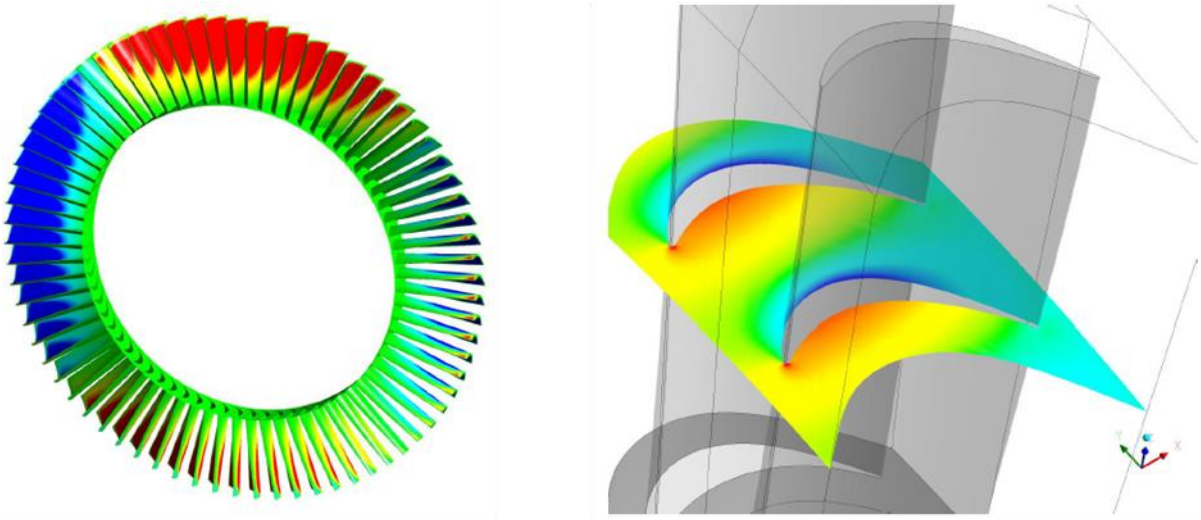
# Master thesis

## Flutter analysis of a low-pressure turbine rotor blade using Computational Fluid Dynamics (CFD)

The design of the low pressure turbine of modern aero engines is constantly pushed toward higher efficiency. The use of lighter materials and the reduction of the size of the engine components allows the decrease of the overall weight and of the fuel consumption. As a consequence, the study of forced response and flutter of the turbine rotor blades became one of the most important challenges for engine manufacturers. Flutter denotes a condition of instable vibrations that might lead to structural failure unless properly damped. In that perspective, a research project was undertaken at the ITTM with the aim to study the aerodynamics and the vibrations in a subsonic test turbine and to develop and validate a numerical tool for aeroelastic analysis of rotor blades.



The aim of this master thesis is to carry out a numerical study of a low-pressure turbine rotor blade using the software Ansys CFX. Steady RANS simulations will be used together with the transient Harmonic Balance Method implemented in Ansys CFX to solve the transient flow field around the rotor blades. The results of the simulations will be employed to analyse the stability of the vibrations of the rotor blading in terms of aerodynamic damping. Additionally, the simulations will provide a basis for the validation of a numerical tool for the aeroelastic analysis of rotor blades which is currently under development at ITTM.

**Duration:** 5-6 Months.

**Requirements:** Interest in CFD and turbomachinery.

**Language:** English / Deutsch

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