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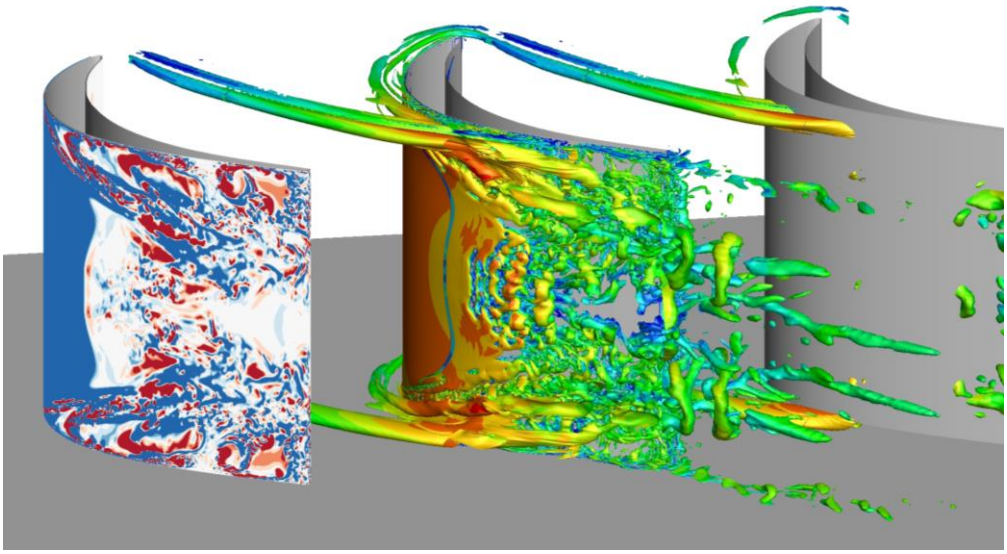
Master thesis

Investigation of a low pressure turbine stage using Computational Fluid Dynamic (CFD)

Modern low pressure turbine (LPT) architectures of aero engines are designed in order to optimize component weight, decrease the fuel consumption and noise emissions. This can be achieved on one hand by the use of lighter materials or, on the other hand, by reducing the engine size. As a consequence, it becomes increasingly important to investigate the forced response and flutter of the turbine rotor blades. Flutter denotes an instability phenomenon that might lead to structural failure in a short period of time unless properly damped. To predict eventual occurrences of flutter during engine operation it is necessary to accurately assess the unsteady aerodynamics and its effects on the structure.



The aim of this work is to simulate the flow in a low pressure turbine stage using Computational Fluid Dynamics (CFD). The first part of the work deals with the generation of a quasi-3D numerical grid of the entire turbine stage (IGV-stator-rotor). Steady RANS simulations should be performed and the results will be compared with the experimental measurements. In the second part of the work a 3D grid of the stage without IGV is required. URANS simulations will be used to investigate the aerodynamics of the stage and to perform a one-way fluid-structure interaction.

Duration: 5-6 Months

Requirement: Interest in CFD (numerical methods, turbulence models, etc) and turbomachinery.

Language: English

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