Institute of Turbomachinery and Flight Propulsion
Department of Aerospace and Geodesy
TUM School of Engineering and Design
Technical University of Munich

Throughflow Parametric Study of Stage Loading in a 1.5-stage Axial Compressor

Bachelor thesis / Semester Thesis

Description: The aerodynamic performance of an axial compressor stage is strongly influenced by stage loading parameters such as work coefficient, flow coefficient, and degree of reaction. These design parameters affect pressure rise, flow turning, Mach number distribution, within the compressor stage and are used to define the geometry of the gaspath as well as the initial metal angles of the airfoils. The goal of this thesis is to perform a systematic throughflow parametric study using an S2 design process. Selected loading parameters shall be varied for 1.5-stage highly-loaded axial compressor stage, and their influence on relevant aerodynamic quantities shall be evaluated.

Work packages:

- Literature review
- Familiarization with the S2-design process MTflow
- Execution of a parameter study
- Evaluation and interpretation of the outcomes
- Writing a report

Requirements/knowledge:

- Good knowledge of turbomachinery
- Good knowledge of Fluid Mechanics and Thermodynamics
- Good knowledge of numerical simulation
- basic programming skills in linux and python/matlab

Type of research: Theoretical/numerical

Begin: 01.08.2026 or later

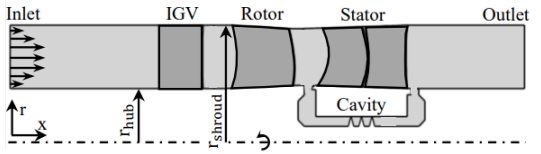


Figure 1: Meridional view of the FRANCC 1.5-stage compressor setup with single rotor and tandem stator.

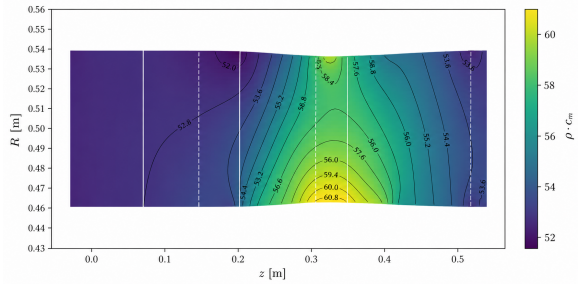


Figure 2: Contour plot of the mass-flow-density distribution ρc_m in the meridional compressor plane.

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