Chair of Turbomachinery and Flight Propulsion
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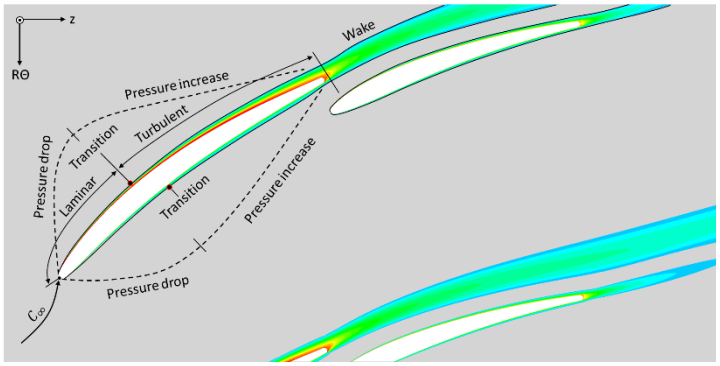
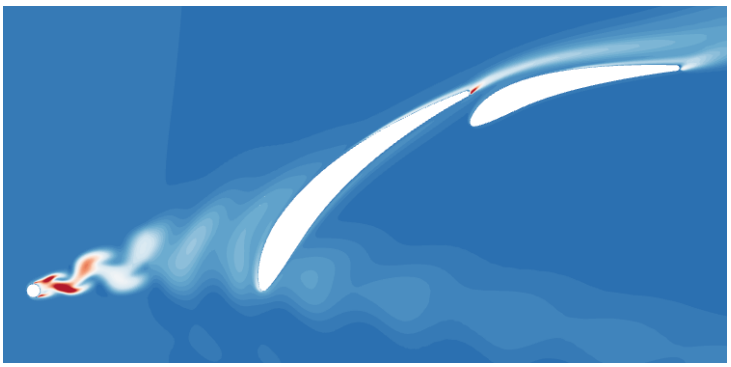
Numerical Development of Compressor Airfoils with Laminar Boundary Layer

Description

The research project IMPROVE comprises the numerical and experimental investigation of a disruptive novel airfoil design concept for compressor blades. The concept of boundary layer laminarization and passive boundary layer stabilization aims to increase the lift and efficiency of compressor airfoils in the central region of the blades, which is characterized by quasi-two-dimensional (Q2D) blade boundary layers.



The student research project aims to develop novel blading concepts. With the help of CFD simulations at the LRZ Linux Cluster, 2D airfoil geometries in the middle section are to be developed first. A long laminar flow path of the boundary layer characterizes these geometries. Based on this, the three-dimensional flow field of the airfoils will be evaluated. In final investigations, the unsteady flow and transition behavior will be examined in more detail.



The student research project offers exciting insights into the development of highly loaded single and tandem configurations using high-performance CFD simulations. An independent and conscientious way of working, an interest in aerodynamics, and advanced knowledge of MATLAB is required.

Tasks:

- Literature research on blading concepts
- Getting to know the process chain
  - Geometry generator
  - TRACE Solver
  - Postprocessing
- Development of airfoils with extended laminar flow region
- Investigation of unsteady transition mechanisms

Requirements:

- Independent way of working
- Basic knowledge of Turbomachinery and CFD
- MATLAB
- Optional: Linux

Language: the thesis can be written in english or german

Start: As soon as possible

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