Übersicht der aktuell am Lehrstuhl angebotenen studentischen Abschlussarbeiten

Datum	Typ	Bereich	Ansprechperson
13.08.2026	Projektarbeit	Numerik	Denis Küper

Implementierung eines Algorithmus zur automatischen Berechnung der Chamber-Line von Schaufelprofilen in MATLAB.

Beschreibung:

Im Rahmen dieser Projektarbeit soll ein vorgegebener Algorithmus zur Berechnung der Chamber-Line anhand des Beispiels von Schaufelprofilen einer Axialturbine in MATLAB implementiert werden. Die Chamber-Line, die daraus sich ergebende Dickenverteilung sowie die Metallwinkel der Schaufel werden für weiterführende Simulationen verwendet und es ist Ziel der Arbeit, den Algorithmus so aufzubauen, dass für beliebige Schaufelprofile eine zuverlässige Berechnung erfolgt.

Date	Type	Field	Contact person
13.08.2026	Master thesis	Numerics	Hakan Demir

Assessment of a Low-Dissipation solver in OpenFOAM

Description:

This thesis assesses the accuracy, numerical dissipation, stability, and convergence characteristics of a fourth-order solver developed in OpenFOAM.

Date	Type	Field	Contact person
13.08.2026	Master thesis	Numerics	Hakan Demir

Large Eddy Simulation of Turbulent Flow over a Porous Medium

Description:

The study by Sadowski et al. (2026) (https://arxiv.org/abs/2605.13195) indicated that the computational domain should be enlarged to adequately represent the largest turbulent structures in this configuration. Accordingly, this master's thesis will investigate turbulent channel flow over a porous medium using an extended computational domain.

Date	Type	Field	Contact person
13.08.2026	Bachelor or Project thesis	Numerics	Hakan Demir

Numerical Diffusion in Passive-Scalar Transport: A Verification Study Using OpenFOAM

Description:

This thesis will investigate these effects using a sequence of simple, well-controlled passive-scalar problems. The emphasis will be on verification: numerical results will be compared with analytical or manufactured reference solutions, and the numerical error will be measured systematically. OpenFOAM will be used for the main CFD calculations.

Date	Type	Field	Contact person
13.08.2026	Bachelor or Project thesis	Numerics	Federico Lo Presti

Acceleration of a Pseudo-Time Poisson Solver for wall distance calculation in a turbomachinery CFD solver

Description:

The current wall-distance solver computes the solution of a Poisson equation using an explicit pseudo-time integration, with associated convergence limitations. The objective of this project is to replace the explicit update with an implicit pseudo-time integration method (e.g., Lower-Upper Symmetric Gauss-Seidel, LUSGS) while preserving the existing framework. The performance of the new solver will be assessed by comparing its convergence rate and computational efficiency against the alternative methods for wall distance calculation.

Date	Type	Field	Contact person
13.08.2026	MA, BA or Project thesis	Numerics	Federico Lo Presti

Strong Scaling Analysis of SharC for a Full Turbomachinery Simulation

Description:

The strong scaling performances of the CFD solver SharC have been previously evaluated using an optimized benchmark, guaranteeing the most efficient parallel execution. In a realistic turbomachinery application, load imbalances and specialized features might affect the strong scaling results. The objective of this project is to perform a comprehensive strong scaling analysis of SharC using a representative turbomachinery simulation. The study will evaluate the parallel efficiency on a large-scale HPC system, identifying potential scalability bottlenecks. The extent of the work can be adapted to bachelor or master students.

Date	Type	Field	Contact person
13.08.2026	Master thesis	Numerics	Federico Lo Presti

Numerical Modeling of Gas Turbines Cooling Flows

Description:

This work focuses on the numerical investigation of cooling flows in gas turbines using CFD. Different numerical modeling strategies are available, ranging from fully resolved geometries, where each cooling hole is explicitly represented in the computational mesh, to reduced-order cooling flow models in which the effect of the cooling holes is reproduced through equivalent injection patches or boundary conditions. The latter significantly reduces mesh size and computational cost while aiming to preserve the relevant cooling flow characteristics. The objective is to assess and improve cooling flow modeling strategies. The exact scope of the thesis will be adapted to the student's interests and background.