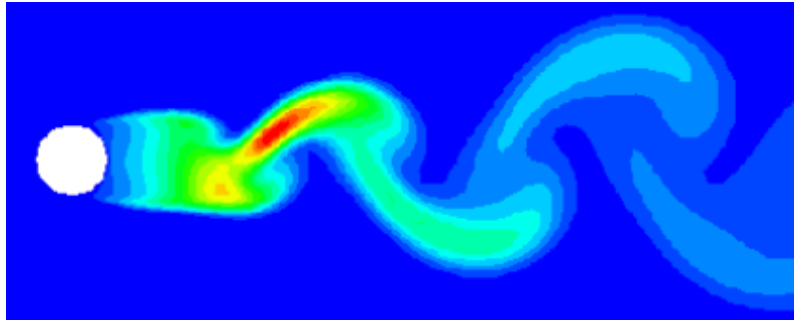


Lecture Announcement Winter Term 25/26

Turbulence Modelling



Snapshot of a turbulent wake behind a circular object. Simulation with a cubic Low-Reynolds-Number $k - \epsilon$ model.

After attendance, the students understand recent turbulence models, which are implemented in common CFD software. They have expanded their competences of networked and critical thinking and are able to assess established methods with regard to accuracy, stability and effort. The students have achieved detailed, also interdisciplinary methodological competences and based on these, they can elaborate solutions of new problems.

Contents:

- Review of fluid dynamical and numerical fundamentals
- Overview over turbulence theory
- Introduction to Direct and Large Eddy Simulation
- Detailed presentation of statistical turbulence models (Eddy Viscosity and Reynolds Stress models)
- Hybrid models: Scale Adaptive (SAS) und Detached Eddy (DES) Simulation
- Wall treatment
- Laminar turbulent transition
- Model additives for stagnation flow, rotation and compressibility

Literature/Teaching Materials: Manuscripts for lecture as well as exercises are available in both English and German. Also, the entire module will be made available in German as a video stream via Moodle. Further literature will be recommended during the lecture.

Prerequisites for Attending: Fundamental of Fluid Mechanics (Grundlagen der Strömungsmechanik), Advanced Fluid Mechanics (Fortgeschrittene Strömungsmechanik), ideally also Computer Simulation of Fluid Flow (Computersimulation von Fluidströmungen)

Dates: Lecture: Tuesdays, 16:15 – 17:45, IC03/112
Exercise: Thursdays, 08:15 – 09:45, IC03/112
Revision course: on demand or towards the end of the semester

Start of Lectures : Tuesday, 14 October 2025, 16:15, IC03/112

Exam Date and Format: to be announced, oral exam in English or optionally in German