SG2213 Applied Computational Fluid Dynamics 3.0 credits

Tillämpade strömningsmekaniska beräkningar

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SG2213 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

SG2212 Computational Fluid Dynamics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

This project course will give you hands-on experiences in computational fluid mechanics (CFD). You will get some insights in the major difficulties in performing CFD computations with good quality and trust and the importance of experiences in basic fluid mechanics phenomena. You will also get some information in similarities and differences in different CFD packages, commercial as well as research codes. The complete process from assumptions and simplifications, mesh design, computation and analysing the results will be covered.

After completing the course you should be able to perform a complete CFD analysis using a commercial or research CFD package.

In specific, you should be able to:

- identify and motivate different approximations and modelling choices in order to be able to complete the analysis within given computational resources,
- chose and specify boundary conditions and initial conditions in relation to chosen models and level of approximations,
- chose the topology and dimensions of the computational grid in relation to chosen models and level of approximations,
- and identify the limitation of the analysis and different sources of errors and how to assess and improve the quality and trust in your computational results.

Course contents

- Three lectures (2x45 min) covering (i) modelling and approximations, (ii) turbulence scales and modelling and (iii) grid design as well as quality and best practice. During the lectures a home assignment will be made in three steps (see examination).
- Invited speakers presenting commercial and/or research CFD packages.
- One day introduction and hands-on practice in one commercial or research CFD package including grid generation, computation and data analysis. Information how to utilise the supercomputing facility at KTH (PDC).
- Solve one selected industrial or research problem in a project group of max four students. This includes to define and perform a complete CFD analysis, analyse the quality and trust in the results and to do some parametric study. The project will be reported and presented at a seminar in the end of the course.

Course literature

To be announced at course start. In 05/06: Tannehill, John C, Computational Fluid Mechanics and Heat Transfer, Taylor & Francis.

Examination

- PRO1 - Project, 3.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Homework and computer assignments (LAB1; 3 university credits).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.