FAF3703 Computational Fluid Dynamics, CFD, in Design and Development 7.5 credits

Computational Fluid Dynamics, CFD, i design och utveckling

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

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

Establishment

Course syllabus for FAF3703 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Language of instruction

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

Intended learning outcomes

The course introduces CFD methodology in technical design and development. Fluid flow processes and system parameters influencing indoor environment, energy use and health aspects of the indoor environment are considered.

Course contents

CFD simulations have partly replaced measurements in the design of system solutions, indoor environments and products. The CFD user has to be familiar with theory and practical applications in order to understand and evaluate simulated results. Partial differential equations and the governing equations for incompressible flows are dealt with. The finite volume method, which is used here, is the leading method in the evaluation of thermal comfort, airborne contaminant movements and health aspects in indoor environments.

Disposition

- Partial differential equations
- Navier-Stokes equations
- Turbulence modeling
- Discretisation of equations
- Initial and boundary conditions
- Preprocessing including meshing
- Solution of governing equations (Fluent)
- Convergence
- Post-processing
- Validation of results

Specific prerequisites

Entry requirements for PhD studies in architectural engineering or similar knowledge, including one basic course in mechanics.

The course is primarily aimed at doctoral students in fluid mechanics, energy, indoor climate, and building design or similar subject areas.

Course literature

H.K. Versteegh and W. Malalasekera. An Introduction to Computational Fluid Dynamics –The Finite Volume Method, Pearson Education Limited, Harlow, England, 2007.

J. Tu, G.H. Yeoh and C. Liu, Computational Fluid Dynamics – A Practical Approach, Elsevier, 2008.

Q. Chen and J. Srebric. How to Verify, Validate, and Report Indoor Environment Modeling CFD Analyses, ASHRAE RP-1133, ASHRAE 1791 Tullie Circle, NE Atlanta, GA 30329-2305, 2001.

Examination

- LAB1 - Laboratory work, 1.5 credits, grading scale: P, F
- LAB2 - Laboratory work, 2.5 credits, grading scale: P, F
- SEM1 - Seminars, 2.0 credits, grading scale: P, F
- TEN1 - Written exam, 1.5 credits, grading scale: P, 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.

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.