MJ2480 Introductions to Computational Fluid Dynamics and Mathematics 6.0 credits

Introduktionskurs strömningsberäkning och matematik

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

Establishment

Course syllabus for MJ2480 valid from Autumn 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Engineering mathematics, BSc level

Only for TAETM

Language of instruction

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

Intended learning outcomes

The course introduces the fundamentals of numerical methodology in energy related area e.g. CFD, Heat transfer, and structural analysis. It then shows how to apply this information to the design and testing of related equipment and other hardware. The main emphasis is on practical use of codes based on Finite Element/Volume methods for subsonic incompressible and compressible recirculation flows. The development of the subject follows a logical progression starting with the definition of geometry and flow domain, following with stating of fluid properties, boundaries and associated conditions, moving through the solution control parameters, finally, the assembly of a complete model. At each stage, alternatives are identified and criteria for assessment are proposed and applied. The instructor will discuss some advanced numerical techniques, some of which will set new industry standards in the 21st century.

Course contents

The course is presented as a series of highly-interactive lecture/discussion sessions.

The aims of the course are:

• Describe the physical significance of each term in the governing equations for CFD.

• Effectively use a commercial CFD package to solve practical CFD problems.

• Quantify and analyze the numerical error in solution of the CFD, PDE's.

• Develop finite volume discretized forms of the CFD equations.

• Formulate explicit & implicit algorithms for solving the Navier Stokes Eqns.

• Create and demonstrate verification strategies for evaluating CFD code.

• Apprise CFD algorithms proposed in the literature

Course literature

Egen litteratur delas ut

Examination

- TENB - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TENA - Examination, 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.

TEN A, 3 ECTS

TEN B, 3 ECTS

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.