LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Simuleringsverktyg
Simulation Tools

FMNN05, 7,5 credits, A (Second Cycle)

Valid for: 2018/19
Decided by: PLED F/Pi
Date of Decision: 2018-03-23

General Information

Elective for: D4, F4, F4-bs, Pi4-bs, Pi4-pv
Language of instruction: The course will be given in English on demand

Aim

Simulation techniques is a field which merges experience in modelling with knowledge in Scientific Computing and programming skills. The aim of the course is to give students in a late stage of their university studies the possibility to work, in a small team, with industrially relevant computational problems in connection with the modelling of complex mechanical systems. The participants will experience how mathematical methods may be found on different levels in industrial simulation tools. In particular, the numerical treatment of ordinary differential equations, with discontinuities and/or without algebraic constraints, and numerical methods for large systems of nonlinear equations will form the backbone of the course.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to describe which questions the software in the course may answer.
- be able to describe the numerical methods used in common commercial simulation tools.
- be able to evaluate simulation results for some simple problems.
- be able account for structural parallels between various engineering problems discussed during the course.

Competences and skills

For a passing grade the student must

- independently be able to apply and evaluate numerical methods within industrial software tools.
- write an algorithmically well structured report in suitable terminology on the mathematical methods applied in industrial simulation tools.

Contents

Theoretical part: Numerical treatment of ordinary differential equations with discontinuities and/or algebraic constraints. Variants of different modelling techniques, variational integrators and other special numerical methods suitable for modelling. Introduction to a modelling language.

Practical part: Numerical experiments with computational tools within commercial and industrial software packages, e.g. Dymola. Similar experiments with selfproduced code in Python/SciPy.

Examination details

Grading scale: UG - (U,G) - (Fail, Pass)
Assessment: A written report, in several parts.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Required prior knowledge: FMNN10 Numerical Methods for Differential Equations or similar course.
The number of participants is limited to: No
The course overlaps following course/s: FMN145

Reading list

- Relevant material (journal articles and extracts from web based handbooks) will be provided at the start of the course.

Contact and other information

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