SG2870 Non - Linear Finite Element Methods 7.0 credits

Icke - linjära finita elementmetoder

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

Establishment

The course syllabus is valid from Spring 2022 according to the school principal's decision: S-2022-0529 Decision date: 2022-02-24

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

English B / English 6

The course supposes previous knowledge in finite element theory.

Language of instruction

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

Intended learning outcomes

After the course, students should be able to

- derive basic non-linear 2D bars, 2D beams and plane elements using the total and updated lagrangian formulations.
- implement von Mises plasticity in one and two dimensions for beam and plane elements.
- implement displacements and arc-length path following procedures
- use the commercial fem package ANSYS to analyse non-linear problems

Course contents

- Geometrical non-linear 2D bars, 2D beams and plane elements
- Different strains and stresses
- Total and updated lagrangian formulations.
- von Mises plasticity in one and two dimensions for beam and plane elements
- Incremental solutions and convergence criteria
- Path following procedures
- Linearised and non-linear stability analyses

Examination

- ÖVN1 - Assignments, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 4.0 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

Oral examination (TEN1, 4 university credits).
Exercises (ÖVN1, 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.