Software tools for mechanics - Basics

ECTS credits
2 credits

Semester
Fall

In brief

Course langage: French

Presentation

Prerequisites

Continuum Mechanics, Weak Formulations or Virtual Power Theorem

Learning objectives

The objective of this course is to master the finite element method to solve simple problems (materials with linear elastic behavior, static):

- Acquire a broad vision of software tools using the finite element method in solid mechanics
- Know the theoretical foundations of the method
- Know and know how to use the finite element method in a software framework
  -- Know how to define a problem in a software framework
  -- Know how to build the steps of the resolution of a problem in a software framework
- Know how to analyze and criticize a calculation result
- Know the limits of a model and of numerical simulation

Advanced modeling and calculation elements will be covered in the Software Tools in Mechanics - Advanced course.

Description of the programme

- Theoretical review on FEM
- Presentation and handling of the Abaqus software
- Resolution of various simple problems (3D volume, linear elasticity) in the form of practical work and a Mini-Project (1 session with a teacher and 1 session independently)

- Use of structural elements (beams, plates and shells), in connection with the Thin structures and instabilities course

Generic central skills and knowledge targeted in the discipline

- Know how to formulate simple problems in a software framework
- Know how to analyze and criticize the results of a calculation
- Know how to choose the most suitable software for the considered problems

How knowledge is tested

- CC1 : MCQ on theoretical part 1 (10 %)
- CC2 : Mini-project paper (65 %)
- CC3 : Report on practical work session related to thin structures course (25 %)

Bibliography

- Lecture notes on theoretical part
- PDF version of slides
- M. Bonnet et A. Frangi, Analyse des solides déformables par la méthode des éléments finis, Les éditions de l'École Polytechnique, 2006
- T.J. Hughes, The finite element method: linear static and dynamic finite element analysis, Dover, 2012

Teaching team

- Stéphane Bourgeois
- Iulian Rosu (CNRS research engineer, Laboratory of Mechanics and Acoustics)
- Emmanuelle Sarrouy

Total des heures		**26h**
CM	Master class	8h
TD	Directed work	2h
TP	Practical work	14h
AA		2h

Useful info

Name responsible for EU

Lead Instructor

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