

Software tools for mechanics - Advanced



ECTS credits
2 credits



Semester
Spring

In brief

> **Course language:** French

Presentation

Prerequisites

Theoretical and software bases of the finite element method ([Software tools for mechanics - Bases course](#))

Learning objectives

This course completes the [Software tools for mechanics - Basics](#) course. Its objective is to bring the student to master the finite element method to solve most of the mechanical problems that he or she may encounter later:

- Know how to choose the appropriate modeling (3D/structural elements, representation of contacts, behavior of materials, ...)
- Know how to put it into practice in a software framework
- Master the methods of solving a nonlinear problem in this context
- Know the possibilities and limits of numerical simulation and its models
- Know how to analyze, criticize and present a calculation result

Description of the programme

- Advanced contact management (with friction, making/losing contact, etc.)
- Implementation of plasticity, in connection with the [plasticity](#) course
- Implementation of large deformations, in connection with the course on [large deformations](#)
- Implementation of dynamic calculations, in connection with the [structural dynamics](#) course
- Mini-Project (2 sessions with teacher and 2 sessions independently)

Generic central skills and knowledge targeted in the discipline

- Know how to formulate complex problems in a software framework
- Know how to analyze, criticize and present the results of a calculation
- Know how to formulate specific development requests for software
- Know how to choose the most suitable software for the problems dealt with

How knowledge is tested

- CC1 : Mini-project paper (55 %)
- CC2 : Reports on practical work sessions (45 %)

Bibliography

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

Total des heures		28h
CM	Master class	4h
TP	Practical work	20h
AA		4h

Useful info

Name responsible for EU

Lead Instructor

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