

UE Numerical methods for nonlinear mechanics



Level
Baccalaureate
+5



ECTS
6 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX9CEAB

Presentation

Description

- From physics to numerical models: continuum mechanics problems, variational formulations, Rayleigh Ritz methods, Finite element one dimensional example
- Introduction to solid mechanics problems : elastostatics virtual work theorem : finite element discretization, the example of simple finite elements (constant strain triangle), Comments about Stiffness matrices
- Variational formulation of an initial boundary value problem: change of configuration, introduction to different stress and deformation tensors, the so called small strain approximation
- Time discretization and incremental problem: Newton method, residual computations, auxiliary linear system computations, boundary condition issues
- Space discretization : finite element method, projection on to a finite dimensional space, isoparametric finite element numerical integration Gauss method
- Constitutive equations integrations : consistent tangent stiffness matrix: numerical approach, Hardening plasticity, integration algorithms, consistent tangent stiffness matrix : analytical approach, Locking and related topics
- Miscellaneous : coupling problems, the rate problem and uniqueness issues

Course parts

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|---|----------------|-----|
| UE Numerical methods for nonlinear mechanics - CM | Lectures (CM) | 36h |
| UE Numerical methods for nonlinear mechanics - TD | Tutorials (TD) | 10h |

Period : Semester 9

Useful info

Campus

› [Grenoble - University campus](#)