

UE Numerical methods for nonlinear mechanics

 ECTS
6 crédits

 Composante
UFR Physique,
Ingénierie,
Terre,
Environnement,
Mécanique
(PhITEM)

 Période de
l'année
Automne (sept.
à dec./janv.)

Diplômes intégrant cet élément

- Master Génie civil

- **Langue(s) d'enseignement:** Anglais
- **Ouvert aux étudiants en échange:** Oui
- **Code d'export Apogée:** PAX9CEAB

Présentation

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

Heures d'enseignement

CM	CM	30h
TD	TD	10h

Période : Semestre 9

Infos pratiques

Lieu(x) ville

➤ Grenoble

Campus

➤ Grenoble - Domaine universitaire