

Non Linear Computational Mechanics

Organiser

Matthieu MAZIERE

Duration

5 days (30h)

Language : English

Dates

From 19 to 23 March 2018

Tuition /Cost

1 500 € net of taxes

Half price for individuals

Location

MINES ParisTech

60 boulevard St-Michel

75272 Paris cedex 06

Computer labs are
planned in the cursus

Prerequisites

- Basic knowledge of linear algebra and calculus, and a basic knowledge in continuum mechanics (stress, strain, linear elasticity)

- Good autonomy in handling a computer for scientific calculations

This course is proposed as a specialized session in the framework of the European Athens week, open to attendants from industry

Learning Objectives

Have an overview of the classical models and of the numerical methods used in the field of Non Linear Computational Mechanics

- Gain a good knowledge of some basic aspects in mechanics of material, including the material constitutive equations, the numerical algorithms and the finite element procedures

- Be able :

- ✓ to choose a material model and the proper procedure to identify the material parameters from experiment
- ✓ to perform calculations of the stress or temperature fields in nonlinear cases
- ✓ to successfully manage the iterative processes associated to non linear behaviour
- ✓ to deal with contact problems
- ✓ to evaluate the quality of a FE result obtained with a nonlinear computation (mesh sensitivity, numerical integration)

Programme

- Basic material models: material modelling, including rheology, plasticity criterion, incremental theory of plasticity, 3D plastic flow, basic hardening rules. Identification procedures, inverse problems

- Advanced constitutive equations : cyclic and complex loadings, damage models, models for thermomechanical loadings, hyperelasticity, polymeric materials

- Finite element formulation: elementary introduction of the method for thermal and mechanical applications. Newton technique, element assembly, tangent matrix. Integration of the constitutive equations, implicit algorithms

- Geometrical nonlinear and contact analysis, stabilization methods. Stability problems. Localization process. Mesh adaptation

- Coupled problems (thermal-metallurgical-mechanical interactions)

Information & Registration

Sarah LAUZON

Email : sarah.lauzon@mines-paristech.fr

Department Mechanical and Materials Engineering

Prof. Matthieu MAZIERE

Email : matthieu.maziere@mines-paristech.fr