

Finite element numerical modelling



Component
École Nationale
Supérieure
d'Électrotechnique
d'Électronique

In brief

- **Ametys Code:** N9EE27A
- **Open to exchange students:** Yes

Presentation

Objectives

Know how to model an electromagnetism/electrical engineering problem in order to perform a finite element calculation;
Understand how the finite element method works;
Apply the concepts learned in class using a free tool on simple electrical engineering examples.

Description

The course 'Numerical Modelling Using Finite Elements' will cover the following topics:

- modelling/formulating equations for the problem: choosing the right EDP, variable and boundary conditions for the device under study;
- using nodal finite elements for discretising scalar potentials in particular;
 - the use of vector finite elements for the discretisation of vector potentials or E, H, B, D fields, for example;
 - the use of formulations coupled with several fields (useful when dealing with different materials or when coupling physical phenomena);
 - additional complementary concepts concerning, in particular, the treatment of non-linear materials, the calculation of force-type quantities, and equivalent boundary conditions (to avoid meshing certain materials or large volumes of air).

Design office sessions will enable these concepts to be implemented using a 'free' finite element calculation tool.

Pre-requisites

Not essential, but it may be useful to have taken the second-year course on finite elements.