Modeling of electromagnetic systems using analytical calculations

Component
École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

In brief

- **Ametys Code:** N8EE21C
- **Open to exchange students:** Yes

Presentation

Objectives

- By the end of this course, students will have mastered the equations and various analytical formulations used to describe the magnetic state of electromagnetic machines and devices.

- They will be able to establish an analytical model necessary for the preliminary design of electromagnetic systems and identify the influence of key parameters.

Description

- Formulate and justify simplifying assumptions to define a magnetostatic problem

- Solve a 2D magnetostatic problem in polar coordinates governed by a Laplace equation in magnetic vector potential

- Calculate and express the observable quantities of an electric machine based on its geometric and structural characteristics

- Apply the proposed method in the case of a simplified model of synchronous machines with permanent magnets, with or without slots

- List the main steps of this method in the case of a simplified model of a double-fed asynchronous machine and a direct current machine