Energy approaches to the design of static converters

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

In brief

- **Ametys Code:** N7EE02A
- **Open to exchange students:** Yes

Presentation

Objectives

Know how to identify the properties, as an instantaneous source (of voltage or current), of the different parts of an electrical diagram;

Know how to construct or identify switching cells on an electrical diagram;

Know how to identify, at different time scales, the degrees of freedom that these cells provide for controlling power transfers;

Know how to express the mathematical transformation relationships performed on the electrical quantities of the cell;

Know the different equivalent circuits of the cell;

Know how to size the semiconductor components of the cell;

Know how to construct the static and dynamic characteristics of the cell's semiconductors;

Know how to synthesize the cell's power semiconductor components.

Description

This course is the first step and the basis for learning static converter design methods. It consists of a series of lectures (6) combined with tutorials (3) to consolidate the acquisition of skills. It is complemented in the same course unit by the "converter design" project.

Pre-requisites

Traditional methods for studying electrical circuits: Kirchhoff's laws, Thévenin or Millman equivalent circuits;

Electrical properties of reactive components (inductance, capacitor);

Concept of electrical sources (voltage, current);

Basic properties of semiconductors operating in switching mode (diodes, transistors, thyristors).