Microprocessor Power Supply

Component
École Nationale Supérieure d'Électrotechnique d'Électronique

In brief

- **Ametys Code:** N9EE09A
- **Open to exchange students:** Yes

Presentation

Objectives

At the end of the training course on microprocessor power supply design, M2-level students will be able to size and simulate a 12V/0.8V 100A multiphase converter, demonstrating their mastery of the design stages when the performance defined in the specifications is achieved.

Description

Course outline:

Introduction
- Advantages of using switching power supply

Buck converter
- Principle of operation
- Continuous and Discontinuous Current Modes (CCM, DCM)
- Losses and efficiency
- Overview of closed-loop stability study

Boost converter
- Principle of operation
- Continuous and Discontinuous Current Modes
- Overview of closed-loop stability study

Multiphase converter

- Principle of operation
- Transient response performances and filter reduction

DC-DC Converter Regulation Loop Analysis

- Theoretical analysis of switched systems using state variables
- Different types of control loops
- Considerations for the controller design

Buck: Voltage and Voltage/Current loop cases

Boost & Buck-Boost: Voltage and Voltage/Current loop cases

Pre-requisites

Knowledge of the operating principles of bipolar and silicon MOSFET transistors, as well as the basics of analog circuit design (Kirchhoff's current/voltage laws, passive dipoles, op-amp-based circuits, etc.).