Modeling by physical analogies & analysis

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

Semester
Printemps

In brief

- **Ametys Code:** N6EE03A
- **Open to exchange students:** Yes

Presentation

Objectives

- Skill in energy system modelling by using electrical equivalent circuit models whatever the physical domain (electrical, mechanical, hydraulic, magnetic, thermal)

- Ability to analyse the time and frequency behaviour of specific transfer functions and apply the root locus method for stability analysis.

Description

Modeling section:
- Introduction to physical analogies in energy systems: generalized energy and power variables
- Elements of physical systems: source, dissipative, or energy storage elements (in kinetic or potential form), interconnection elements (generalized mesh and node laws, transformers, and gyrators)
- Causality in physical systems
- System examples: academic cases, level control, position control

Analysis section:

Additional information on the analysis of continuous linear systems:
- Linearization of a nonlinear system
- Time analysis: influence of poles and zeros
- Stability analysis using the root locus method

Pre-requisites

Circuit fundamentals, continuous linear systems control