

Lagrangian approach to electromechanical systems



Component

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

In brief

- > **Ametys Code:** N8EE24A
- > **Open to exchange students:** Yes

Presentation

Objectives

Be able to easily establish the law of behavior of a complex system using Lagrangian mechanics.

Description

Advantages of Lagrangian mechanics:

It allows the law of behavior of a system to be established by analyzing its energy exchanges with the outside world, unlike Newtonian mechanics, which allows the law of behavior of a system to be established by analyzing the forces applied to each of the solids that compose it. Thus:

- There is no need to manipulate all the forces that do not exchange energy with the system, such as connection forces. This simplifies the study of complex systems with a large number of solids (and therefore connections).
- The energy-based approach allows multiphysical systems to be handled.
- It is a scalar (energy) approach rather than a vector (force) approach.

- There is no longer any need to isolate each solid.

Course content: (6 lecture slots, 1 tutorial slot)

- Review of the main concepts of mechanics (reference frames, forces, moments, kinematic connections, etc.).
- Review of the principles of Newtonian mechanics (PFD).
- Presentation of concepts used in Lagrangian mechanics (mobility of a system, generalized coordinates, energies).
- Presentation of Lagrangian mechanics equations based on Newtonian mechanics equations.
- Presentation of the concept of virtual mobility.
- Adjustment of equations to address electromechanical issues.