Closed-loop control of continuous linear systems

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

In brief

- **Ametys Code:** N7AE03C
- **Open to exchange students:** No

Presentation

Objectives

Be able to...

• Choose a type of controller suitable for a specification,

• Simplify models and determine their domain of validity,

• Calculate the parameters of a P, PI, Phase-Advance, PID controller using different methods,

• Choose the method and structure of the controller based on the context and specifications,

Description

Interest of the closed loop: open loop, closed loop, proportional correction, stability, accuracy, speed = tough dilemma!, calculation of the proportional controller / specifications

Integral-type controllers: dominant pole compensation method, symmetrical optimum method, 1/10 method, implementation

Derivative-type controllers: calculation of parameters by imposing the bandwidth, by the pole compensation method, implementation.

PID-type controllers: calculation by pole compensation, by PI combination – Phase lead
Experimental methods for tuning PI, PID controllers: Expert tuning, Broïda method, Ziegler-Nichols method, and relay method

Control architectures: PI and beyond..., more state variables to control, a bit of anticipation
Context: supporting application

Pre-requisites

- Continuous Linear System, basic calculations with Laplace transform
- Calculations with complex numbers, solving first- and second-order differential equations