

## Feedback systems

# Introducing

## Description

Outline :

Chapter 1 Introduction to Automation

What is automation

On the notion of system and input/output/disturbance

Determining the I/O of a system

BO vs BF and Setpoint vs Command

Introductory example

The systems considered and the I/O model (linear diff. equation of order  $n$ ).

Chapter 2 Mathematical tools

Some definitions

time response, step, ramp, Dirac, causality, Analysis,

Control, linearity, Invariance

The Laplace transform, a short and useful version

Def., table, derivation= $\leq$ EDO role of ICs, final value theorem

The notion of transfer function

Chapter 3 Modeling

Why model...How to model

Qq reminders (elec, mech, basic fluid) => Passage to Laplace

Block diagram - Definition and conventio

Simplification and transformation

Linearization

Chapter 4 Time Response

Reminder of simple EDO resolution

Solving by Laplace (simple element decomposition)

1st-order systems

Second-order systems

On the notion of performance: response time, overshoot and accuracy

Other systems (unstable and pole dominance)

On the notion of performance: response time, overshoot and accuracy

Chapter 5 Harmonic response

Why and how

A complex example and introduction to the various plots

The pure integrator and the pure derivator

The first order

Second order

Method for plotting asymptotes for a qcq order

From BO to BF: black's chart

## Objectives

Frequency approach to continuous linear control

## Necessary prerequisites

Ordinary differential equation

Complex variable

## Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

## Practical info

## Location(s)

