Introduction to Non-linear control

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

In brief

- **Ametys Code:** N8EE13B
- **Open to exchange students:** Yes

Presentation

Objectives

Be able to...
- characterize a nonlinear system using the first harmonic method and identify the method's domain of validity,
- synthesize a linear corrector to modify the characteristics of self-oscillation,
- characterize a nonlinear system using the phase plane method
- adjust simple control elements (threshold, hysteresis, feedback coefficient, linear corrector) in order to obtain a given performance.

Description

1. Introduction to nonlinear system control
Limitations of linear methods, definition of a nonlinear system and its domain of definition, the most common nonlinearities, methods of study and their classification

2. First harmonic method

Principles and Fourier series, method for calculating equivalent transmittance, stability of self-oscillations, examples of temperature control in TOR, saturated amplifier, linear correction of nonlinear systems

3 Phase plane method

Principle, trajectory calculation method, principles of linear correction of nonlinear systems in the phase plane, state representation

Pre-requisites

- Fourier series decomposition,
- Calculations with complex numbers,
- Solving first- and second-order differential equations,
- Basics of matrix calculus,
- N6EE02: Signals & Automation,
- N6EE03: Electrical circuits and systems.