EL2620 Nonlinear Control 7.5 credits

Olinjär reglering

Course syllabus for EL2620 valid from Autumn 08, edition 1.

**Intended learning outcomes**

After finished course, the students will have knowledge in analysis of nonlinear dynamical systems using tools from control theory, such as linearization, Lyapunov methods, and describing functions. They will be able to use computer-based tools for modeling, simulation and control design of nonlinear systems. They will have knowledge about advanced nonlinear control design methods. The theory is illustrated by many examples from mechanical, electrical, chemical and aeronautical engineering, as well as from bioengineering and finance.

In particular, the students should be able to:

- Solve problems using classical methods for analysis of nonlinear dynamical systems, such as linearization and phase-plane analysis, equilibria and oscillations.
- Use Simulink for modeling and simulation of nonlinear systems.
- In depth knowledge on how to solve stability problems using Lyapunov and LaSalle methods.
- In depth knowledge about input-output stability using the circle criterion and describing function analysis. The students should be able to apply this theory to compensation for saturation (anti-windup), friction, back-lash and quantization.
- Basic knowledge about passivity theory.
- Be able to solve simpler control design problems using high-gain design methods, such as linearization by high gain and sliding modes.
- Be able to solve simpler control design problems using Lyapunov design methods and feedback linearization.
- Determine controllability for nonlinear systems.
- Have basic knowledge about optimal control theory, and how to solve standard optimal control problems.

**Course main content**


**Eligibility**

**Literature**


**Examination**

- LAB1 - Laboratory Work, 0.5 credits, grade scale: P, F
- LAB2 - Laboratory Work, 0.5 credits, grade scale: P, F
- LAB3 - Laboratory Work, 0.5 credits, grade scale: P, F
- TEN1 - Examination, 6.0 credits, grade scale: A, B, C, D, E, FX, F
Requirements for final grade

TEN 5.5 cr, LAB1 1 cr, LAB2 1 cr