

Hydraulic Servo Systems

Programme course

6 credits

Hydrauliska servosystem

TMHP51

Valid from: 2019 Spring semester

Determined by
Board of Studies for Mechanical
Engineering and Design

Date determined
2018-08-31

Main field of study

Mechanical Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Master's Programme in Mechanical Engineering
- Mechanical Engineering, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Fluid power systems, Automatic Control

Intended learning outcomes

This course intends to give a detailed knowledge in hydraulic servo systems and its applications. The contents of the course covers both the mobile and industrial areas and their different characteristics. After completing the course the student is expected to

- understand the function and characteristics of hydraulic servo components
- be able to apply calculation methodology for component selection and system design
- be able to model and implement dynamic analyzes of closed loop hydraulic servo systems regarding performance, controllability and energy consumption
- be able to analyze measurements on components and systems

Course content

Extended theory on orifices, flow forces on valve elements and fluid physical properties. Modelling and simulation technology. Mathematical modelling of component and system dynamics. Control engineering analysis. Simulation of fluid systems dynamics. Proportional and servo valve designs and characteristics of different pilot and power stages. Servo systems for control of position, velocity and force. Multi-axis loads. Control strategies and dynamic characteristics. Sensor technologies and measurement methods for components specific to hydraulic servo systems.

Teaching and working methods

The teaching consists of lectures, lessons and laboratory exercises. Educational study visits are made to different industries.

Examination

TEN3	Written examination	3 credits	U, 3, 4, 5
LAB3	Laboratory work	1 credits	U, G
UPG2	Hand-in assignment	2 credits	U, G

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses

TMMS10 - Fluid Power Systems and Transmissions
TMMS13 - Electro Hydraulic Systems
TMPMo6 - Project Course Advanced - Mechatronics

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Mikael Axin

Examiner

Magnus Sethson

Education components

Preliminary scheduled hours: 54 h

Recommended self-study hours: 106 h

Course literature

Compendia

J-O Palmberg, Analys och syntes av en tryckregulator

Krus P, Introduction to Transmission Line Dynamics

Palmberg J-O, Tryckstyrning

Rydberg K-E, Feedbacks in Hydraulic Servo Systems

Rydberg K-E, Hydraulic Servo Systems - Theory and Applications

Rydberg K-E, Hydraulic Systems with Load Dynamics

Other

Formula Book for Hydraulics and Pneumatics