Hydraulic Servo Systems

Programme course

6 credits

Hydrauliska servosystem

TMHP51

Valid from: 2020 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2019-09-23

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 theor 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

UPG2	Hand-in assignment	2 credits	U, G
TEN3	Written examination	3 credits	U, 3, 4, 5
LAB3	Laboratory work	1 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
TMPM06 - Project Course Advanced - Mechatronics

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.
- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

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