Study program / course: Mechanical Engineering

Type and level of study: Master academic studies

Course: Fluid Power and Control

Lecturers: Gordić R. Dušan, Šušteršič M. Vanja

Status of course: Elective for module M_4, III semester

Number of ECTS: 6

Precondition: Fluid Mechanics, Fluid Power

The objective of course

The objective of the course is to introduce the students with basic principles and techniques of modeling of hydraulic and pneumatic components and systems i.e. preparation for design of different fluid power systems.

The outcome of course

Upon the completion of the course students will be capable to:

- understand the principles of mathematic modeling of hydraulic and pneumatic components and systems
- perform numerically modeling of non-stationary phenomena related to fluid power components and systems in commercial software applications,
- apply learned technical principles, ideas and theories into real-life applications.

Syllabus

Theoretical study

Fluid power components and their steady state characteristics (pumps, compressors, motors and cylinders, spool valves, flow force, flapper-nozzle valve, servovalves), Dynamic modeling of fluid power components (non-stationary flow equations, pumps, compressors, motors and cylinders, valves, non-stationary flow force, hydrostatic transmissions, transmission line dynamics), Techniques of dynamic analysis of fluid power components and systems; linear theory (linearization, Laplace transform, transfer function, frequency response, optimization of closed circuit transfer function); non-linearities in hydraulic systems, describing function), Computer simulation and software packages for fluid power system analysis, Analysis of dynamics and stability of fluid power components and control systems.

Practical classes include:

Exercises are auditory (solving the concrete mathematical problems) and laboratory (modelling on PC software). In the framework of study research work students will be trained for basic research in the scope of the subject.

Recommended reading

1. Gordic, D.: Fluid power hydraulics, Faculty of Mechanical Engineering, 2007. (In Serbian)
2. Yeaple, F.: Fluid power design handbook, Third Edition, Marcell Dekker, New York,1996.

The number of hours of active teaching:				Other classes:
Theory: 3	Practical classes: 1.4	Other forms of teaching: 0.6	Research study: 0	1

Methods of teaching

Lecturing include theoretical classes and exercises (auditory and laboratory). Lecturing is covered with multimedia. Evaluation of knowledge is performed through homeworks during the semester.

Evaluation of knowledge (the maximum number of points 100)

Pre-final exam obligations	**points**	**Final exam**	**points**
Activities during the classes:	**10**	Written exam:	
Homework:	**40**	Oral exam (defense of the project):	**30**
Project:	**20**		