



DOCTORAL
SCHOOL
AT GDAŃSK
UNIVERSITY
OF TECHNOLOGY

Course: Selected topics in electrical engineering - modelling of electrical machines

Teaching hours: 15 h

Prerequisites: The course is primarily open to all PhD students at Gdansk University of Technology.

This course is compulsory for PhD students assigned to Automation, Electronics and Electrical Engineering tracks at Doctoral School at Gdańsk University of Technology

Course outline

Content

This module is all about getting the student to be prepared to understand the principles of electromechanical energy conversion and formulating equilibrium equations from the energy-state functions. The sessions provide essential information that you require to develop models of electrical machines. The course is designed to deliver the students knowledge on voltages and torques generated in electrical machines. Throughout the course the students should also gain basic skills to control torque and velocity of electrical machines.

General topics coverage:

1. Introduction to the basic coordinates for the electrical and mechanical systems, conservative and dissipative lumped elements, and coenergy/energy-state functions.
2. Energy-state functions for a system of inductances and a system of capacitances.
3. A restricted form of Lagrange's equation.
4. Degrees of freedom and generalized coordinates.
5. Formulation of equilibrium equations for electromechanical systems –the Euler-Lagrange equation.
6. Electromagnetic forces and torques from Lagrange's equation
7. Models of induction machines.
8. Models of synchronous machines.

Teaching mode

There will be 15 hours of lectures, to be completed during the third semester of PhD programme. The basic teaching method will be in the form of a lecture. During the course students will be asked about selected issues related to the presented topics. The course is entirely delivered in English.

Examination

PhD students will be required to demonstrate skills, knowledge and understanding of the topics presented in the course during the oral exam.

Fundamental readings:

1. Meisel J.: Principles of electromechanical energy conversion, McGraw-Hill, Inc, New York, San Francisco, London, Sydney.
2. Krause P.,C.: Analysis of electric machinery, McGraw-Hill Series, New York, San Francisco, London, Sydney, Tokyo, Toronto.