Title: Electric machines modeling

Naslov: Modeliranje električnih strojev (Univerzitetni študijski program 1. stopnje Elektrotehnika, smer: Energetika in mehatronika, letnik:3, semester:5, šifra predmeta: 35)

Lecturer: Prof. Dr. Damijan Miljavec

Aim of the course:

The aim of the subject is to upgrade theoretical knowledge and functional understanding of electrical machines. To prepare the students for independent synthesis and analysis of electric machines model circuits and their application to address steady state and transient electro-mechanical condition. To attain the ability to determine the circuit model parameters based on electromechanical testing of electrical machines. Upgraded theoretical knowledge of electrical machines will enable the students to design the electrical machines, integrate electrical machines in drive systems and using electric machines in mechatronic systems and power conversion.

Required (pre)knowledge:

Electric machines - basics

Contents:

The use of basic electromagnetic laws in description of electric machines (the energy in the magnetic field, energy conversion, force and torque). The electromagnetic properties of materials used in electrical machines. Magnetic and electric circuits' analogy used to describe electric machine.
The circuit models of transformers, DC machines, synchronous machines, brushless machines and induction machines. Steady state analysis of electric machines based on circuit models.
The general circuit theory used to describe electric machines and principles of models transformation.
Transformations of circuit models of synchronous machines, brushless machines and induction machines in to the models based on the general theory of electric machines. Addressing the steady state and transient electromechanical states of electric machines, described by the general theory of electric machines.

Selected references:

Chee-Mun Ong: **Dynamic simulation of Electric Machinery Using Matlab**, Prentice Hall, 1998

P. C. Krause, O. Wasynczuk, S. D. Sudhoff **Analysis of Electric Machinery and Drive Systems** IEEE Press, (2nd edition), 2002 (ISBN 047114326X)

P. C. Krause, O. Wasynczuk, S. D. Sudhoff: **Analysis of Electric Machinery** McGraw-Hill, 1986; Ponatis: IEEE Press, 1995

P. S. Bimbhra: **Generalized Theory of Electric Machinery**, Khanna Publishers, Delhi, 2004