Theme	**Model-based control of electric motors with permanent magnets (MT3)**
Supervisor	Ing. Pavel Píša, Ph.D. / Consultant: Ing. Květoslav Belda, Ph.D.
Affiliation / Phone	ČVUT, FEL, Karlovo nám. 13, Praha 2 / 2 2435 7223 ÚTIA, Pod Vodárenskou věží 4, Praha 8 / 26605 2310
E-Mail / Web	pisa@fel.cvut.cz / http://cmp.felk.cvut.cz/~pisa/ belda@utia.cas.cz / http://as.utia.cas.cz/asc
Key Words	Synchronous electric motors with permanent magnets, speed control, force control, predictive control, modeling, mathematical-physical analysis
Specification	Latest development stage in the domain of electric motors is represented by brushless alternate current electric motor, also known as a permanent magnet synchronous motor (PMSM). These motors are employed in many applications connected with industrial robotics and machine tools and driving of transport means. The aim of the theme is a composition of suitable mathematical description of PMSM electric motors for model-based control and algorithmic implementation of the control.
Tasks	1. Study basic types of structural configuration of synchronous electric motors with permanent magnets. 2. On the basis of mathematical-physical analysis compose suitable mathematical model of synchronous motor with permanent magnets. 3. Study the basis of model-based control design and select suitable algorithm for motor control. Consider separately position control, speed control and torque (force) control. 4. Prove selected algorithm by simulation and in case of availability of real electric motor, prove it experimentally as well.
Literature	1. Freescale Semiconductor: 3-Phase PM Synchronous Motor Vector Control Using a 56F80x, 56F8100, or 56F8300 Device, Application Note Rev. 3, 1/2005, http://cache.freescale.com/files/product/doc/AN1931.pdf. 2. Rossiter, J., A.: Model-Based Predictive Control – A Practical Approach, CRC Press, London 2003. 3. Other full-text sources: http://as.utia.cas.cz/asc - Link to GPC pages, http://cmp.felk.cvut.cz/~pisa/
Note	Theme for master's thesis.