



Department of Electrical Engineering
Tallinn University of Technology
DOCTORAL SCHOOL OF ENERGY- AND GEOTECHNOLOGY II

INTENSIVE COURSE

"PERMANENT MAGNET SYNCHRONOUS MACHINE CONTROL (FIELD ORIENTED CONTROL AND DIRECT TORQUE CONTROL) FOR WIND ENERGY CONVERSION SYSTEMS AND DRIVES"

Lecturer: Dr. Antoni ARIAS, Universitat Politècnica de Catalunya (Catalonia, Spain)
Venue: Ehitajate tee 5, VII-431
Time: 8.-9.05.2013.

TOPICS AND TIMELINE

May 8, 2013

9.00-10.30 Introduction to the Electrical Drives. Permanent Magnet Synchronous Machine (PMSM) Modelling
10.30-12.00 PMSM Field Oriented Control
12.00-13.00 Lunch
13.00-14.30 Speed & Current PI tuning
14.30-16.00 Simulation models and experimental platforms. Case study: Wind Turbines

May 9, 2013

9.00-10.30 Direct Torque Control. Voltage Source Inverter
10.30-12.00 Space Vector Modulation
12.00-13.00 Lunch
13.00-14.30 Introduction to the Matrix Converters
14.30-16.00 Introduction to the Sensorless Control

Intensive course will be held in English

Registration deadline: **03.05.2013**

Additional information and registration:

Dr. Dmitri VINNIKOV, tel. 6203705, e-mail: dmitri.vinnikov@ieee.org



8.-9.05.2013
Ehitajate tee 5, VII-431

INTENSIVE COURSE

Permanent Magnet Synchronous Machine control (Field Oriented Control and Direct Torque Control) for Wind Energy Conversion Systems and Drives

Dr. Antoni ARIAS
Universitat Politècnica de Catalunya (Catalonia, Spain)

Abstract:

Electric machines (EM) drives absorb the majority of all electrical energy produced. Conversion of electrical power into mechanical power involves EM ranging from below 1kW up to several dozen of MW. In the industrial countries, EM take some 65% of the entire electrical energy available.

Many EM control methods exist, but among them Field Orientated Control (FOC) and Direct Torque Control (DTC) deserve special attention since both techniques can be considered as high performance vector controllers based on the flux and torque decoupling.

Permanent Magnet Synchronous Machines (PMSMs) have several advantages, such as high efficiency and low volume and weight, which make them attractive for aerospace, wind energy, electrical vehicles and high performance servo drives. Currently, PMSM are substituting other AC Machines becoming a key point for the sustainable development of the present century.

In the lecture, it will be reviewed the PMSM advantages and a full model will be obtained. Then FOC and DTC concepts and the guidelines for its further implementations on a DSP state of the art platform will be addressed. A small introduction on Sensorless drives will be also pointed.

About the Speaker



Antoni ARIAS (M'03) received the BEng degree in electrical engineering, MEng and PhD degrees in control and electronic engineering from the Universitat Politècnica de Catalunya, Catalonia, Spain, in 1993, 1997 and 2001 respectively.

Since 1996 he has been a Lecturer at the Universitat Politècnica de Catalunya and was appointed as an Associate Professor in 2002 at the same University.

In 1999 he was a visiting research assistant and part time lecturer at the University of Glamorgan, UK. In 2003 and 2004 he joined as a Visiting Fellow the Power Electronics, Machines and Control Group at the University of Nottingham, UK.

Since September 2011 he is in the Laboratoire de Génie Electrique de Paris as a Visiting Professor.

His research interests are variable-speed drive systems, power electronics converters and control strategies.