

DIE-GITI-439 Fundamentals and applications of electric drives

SEMESTER: Fall

CREDITS: 3 ECTS

LANGUAGE: Spanish

DEGREES: GITI

Course overview

Speed control of induction motors using scalar V/f control is deeply studied. Fundamentals of inverters and PWM generation is also studied. In addition, two lab. experiences using commercial V/f equipment are also done.

Prerequisites

Basic knowledge of power system and circuits fundamentals.

Basic knowledge of electric machines.

Course contents

Theory:

- 1. Introduction to the electric drives.** What are they? What are they used for?
- 2. Modeling dynamical rotating systems.** Introduction. Dynamic equation. General analytical scheme. Gears and pulleys. Torsional resonance and electric analogy. Per unit system in mechanical systems. Load types.
- 3. Speed scalar control of induction machines. loop and closed loop schemes. Slip compensation.** Introduction. Basic principles in induction machine. Steady-state model. Comparison between steady-state and dynamical models. Principles of constant flux control. Operation zones and limitations. Compensation of voltage droop at low speed. Soft start. Open
- 4. Sinusoidal PWM.** PWM fundamentals. Triphasic PWM. Harmonics. Effects on the induction machine.

Laboratory:

There will be two 2-hour sessions.

- P1.** V/f Control of induction motor. Commercial speed controller. Basic use.
- P2.** V/f Control of induction motor. Commercial speed controller: PWM and starting ramp.

Textbook

- Novotny D. W., Lipo T. A., *Vector control and dynamics of AC drives*, Oxford University Press, 1996.

Grading

A minimum overall grade of at least 5 over 10 is necessary to pass the course. The overall grade is obtained as follows:

- Final exam 70% + other exams 30% (typically there are 2 additional short exams) + 10% Lab.