Tárgytematika / Course Description
Electric Machines and Drives

GKNM_AUTA009

Tárgyfelelős neve / Teacher's name: dr. Horváth Krisztián
Félév / Semester: 2026/27/1
Beszámolási forma / Assesment: Vizsga
Tárgy heti óraszáma / Teaching hours(week): 2/0/0
Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The aim of the course is to introduce the structure, operation and state-of-the-art control methods of modern electric drives. Students will learn about dynamic modelling of DC and AC machines, design of controllers for electrical drives, and the implementation and testing of simulation models of controlled drive systems in MATLAB/Simulink environment.

TANTÁRGY TARTALMA / DESCRIPTION

Description:

Introduction

Definition and applications of electric drive systems.

DC machine drives

Steady-state and dynamic modelling of DC machines. Implementation of DC machine models, design of controllers, simulation studies of controlled DC drives in MATLAB/Simulink environment. Description of the cascade control structure.

Induction machine drives

Introduction of Clarke and Park coordinate transformations for AC machine modelling. Modelling of induction machines. Implementation and simulation study of a dynamic model of an induction machine in MATLAB/Simulink. Structure of variable speed AC drives. Scalar and vector control methods for induction machine drives. Implementation and simulation study of controlled induction machine drives in

MATLAB/Simulink.

Synchronous machine drives

Modelling of synchronous machines. Implementation and simulation study of dynamic models of permanent magnet synchronous machines in MATLAB/Simulink. Control methods for permanent magnet synchronous machine drives. Implementation and simulation study of controlled permanent magnet synchronous machine drives in MATLAB/Simulink.

Model-based control algorithm development for AC machine drives

Demonstration of a model-based control algorithm development methodology for electric drives using the example of an induction machine drive.

Sensorless estimation and control methods for AC drives

Motion-sensorless state and parameter estimation techniques for induction and permanent magnet synchronous machine drives. Motion-sensorless control of AC drives.

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Assessment's method:

During the semester the obligation is to pass one mid-term exam. Pass level is minimum 51%.

In the case of a successful mid-term exam, the course can be completed with a written exam during the exam period. A good or excellent mid-term exam result is acceptable as the final result of the course. In this case, no further exam is required during the exam period.

Grading for exams:

- 86% - 100% excellent (5)
- 71% - 85% good (4)
- 61% - 70% satisfactory (3)
- 51% - 60% pass (2)
- 0% - 50% fail (1)

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Obligatory material:

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL