University POLITEHNICA Timişoara

Dept. ELECTRICAL ENGINEERING

Project UPT MONOGRAPHS

Title: ADVANCED ELECTRIC DRIVES – AN UPT SELECTION

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Short description:

The monograph, written in English, presents the main achievements of the Timisoara School of Electric Drives and their impact in both the academic and industrial (national and international) areas.

The structure of the monograph:

1. Introduction (authors: Prof. dr. ing. D. Popovici, Prof. dr. ing. S. Muşuroi)

For starting, the historical evolution of Timisoara School of Electrical Drives within UPT is first presented, and then the profiles of the outstanding

personalities who have defined it are also drew: Acad. Corneliu MIKLOŞI, Prof. Em. Dr. ing. Mihai BRAŞOVAN, Prof. dr. ing. Eugen SERACIN.

The introductory chapter aims to highlight the main monographs, treatises and scientific papers illustrating the concerns and results of the electric drives collective.

2. Starting and braking methods of the series and parallel DC excitated (authors: Prof. dr. ing. D. Popovici, Prof. dr. ing. S. Muşuroi)

The chapter presents the authors' results related to the starting and braking methods for the parallel and series DC excitated machines.

3. Scalar control of the induction machine including also the mathematical model for its non-sinusoidal feeding regime (author: Prof. dr. ing. S. Mușuroi)

In this chapter a mathematical model of the three-phase induction machine with a cage rotor under the conditions of the non-sinusoidal feeding regime is developed. Then, based on the author's results, few closed-loop and open-loop scalar control schemes for this type of machine are presented.

4. DTFC of the induction machines (authors: Conf. dr. ing. C. Lascu)
    - Using sensors
    - Sensorless

This chapter is devoted to high performance vector control of sensorless induction machines drives. It approches the most important features of the sensorless induction motor drives.

5. Scalar control of PMSM. Study case for applications up to 2.2 kW (authors: Dr. ing. V. Olărescu, Prof.dr.ing. S. Musuroi)

In this chapter, two scalar control systems for the PM synchronous machines (SPMSM) are presented. They used two Hall sensors with and without the machine currents estimation in order to determine the machine rotor position and speed. Also for the maximum current value limitation an electronically implemented system, by means of which the peak value of the current can be measured, was developed and here presented. The experimental results are realized for powers up to 1.2 kW.

6. Sensorless oriented vector control of PMSM. Study case for applications up to 2.4kW (authors: Ş.l. dr. ing. C. Ancuți, Dr. ing. V. Olărescu)

The chapter highlights the realization of a sensorless field-oriented vector control system, using the mathematical model of the surface permanent magnet synchronous machines, in which three shunts are used for measuring the machine currents. The chapter concludes with a constructive analysis of the electromechanical and acoustic performances of the SPMSM in compared to the induction machine in a wide speed range operation.

7. PM assisted reluctance synchronous machine – optimal design (authors: Prof. dr. ing. S. Muşuroi, Conf. dr. ing. C. Şorândaru, Ş.l. dr. ing. M. Svoboda)

In this chapter, authors' contributions in the optimal design of permanent magnets assisted synchronous machines with variable reluctance rotor are presented. The simulation results obtained with the OPERA software for three machine topologies together with the experimental results obtained on the built prototype are highlighted.

8. Sensorless oriented vector control of PM assisted reluctance synchronous machine – study cases for application up to 2.4 kW. (authors: Ş.l. dr. Ing. C. Ancuţi)

The chapter presents a comprehensive implementation of the motion – sensor and sensorless control of PM assisted reluctance SM drives via vector control. The feature of the sensorless control is based on the speed observer that here is using the signal injection method.

9. SRM optimal design. Study case (authors: Conf. dr. ing. C. Şorândaru)

This chapter deals with an optimal design of a 6/4 switched reluctance motor. The design software has two options: optimizing both the machine efficiency and weight of active materials.

10. Control strategies based on new converter topologies for SRM drives (authors: Conf. dr. ing. C. Şorândaru)

This chapter presents two control strategies for the switched reluctance motor: sensor-based control and sensorless control. In the same time, a new type of converter topology is introduced.

11. Power factor correction in switching power sources used in electrical drives (authors: Prof. dr. ing. D. Popovici, Prof. dr. ing. S. Mușuroi, Ş.l. dr. ing. C. Ancuți, Conf. dr. ing. C. Şorândaru, Ş.l. dr. ing. M. Svoboda)

This chapter presents the power factor converter topologies together with their passive filters developed by our collective for being used in household applications.