

Special Issue on “Control in Power Electronics and Drives”

It is my pleasure and an honor for me to present this *Special Issue on Control in Power Electronics and Drives* in the Bulletin of the Polish Academy of Sciences.

The field of power electronics is today one of the most challenging areas of electrical engineering, because using modern semiconductor power devices allow to process and control electrical energy in an elegant way with high efficiency and performance. Also, developments in digital signal processing (DSP) and Field Programmable Gate Array (FPGA) create possibilities to implement even very complex algorithms in a short sampling time required in power converter systems.

This Special Issue is intended to focus on recent research and trends in application of power converters for AC motor control, active filtering as well as power flow control. This issue is grouped into following main categories.

I. SURVEY PAPERS

- *Assessment of direct torque control for induction motor drives* by Domenico Casadei, Giovanni Serra, Angelo Tani and Luca Zarri, University of Bologna, Italy
- *Modern active filters and traditional passive filters* by Hirofumi Akagi, Tokyo University of Technology, Japan

These papers authored by world-known experts have a survey nature, covering different aspects of the technology and establishing the state of the art in modern direct torque control (DTC) of induction motors and active as well as passive filtering for line power harmonics neutralization.

II. PREDICTIVE CONTROL

- *Predictive torque and flux control for the synchronous reluctance machine* by Mario Pacas, R Morales-Caporal, University of Siegen, Germany
- *Minimization current error area of the DC/AC inverter controlled by predictive current control method* by Adam Ruszczyk, Białystok University of Technology, Poland
- *Predictive direct power control of a three-phase boost rectifier* by Patrycjusz Antoniewicz and Marian P. Kaźmierkowski, Warsaw University of Technology, Poland

These papers are mainly dedicated to study several applications of predictive controllers which implement on-line optimization procedures.

III. CONTROL OF PMSM AND DFIM DRIVES

- *Sensorless speed control including zero speed of non salient PM synchronous drives* by Henrik Rasmussen, Aalborg University, Denmark
- *New method of direct reactive energy and torque control for permanent magnet synchronous motor* by Michal Janaszek, Electrotechnical Institute, Poland
- *Direct torque control of doubly fed induction machine* by François Bonnet, Paul-Étienne Vidal, and Maria Pietrzak-David, ENSEEIHT, Toulouse, France

These papers present new solution for practical Permanent Magnet Synchronous Motor (PMSM) and Double Fed Induction Motor (DFIM) drives.

IV. ADVANCED CONTROL

- *Extended Kalman filters in the control structure of two-mass drive system* by Krzysztof Szabat, Teresa Orłowska-Kowalska, Krzysztof P. Dyrz, Wrocław University of Technology, Poland
- *Parameter independent encoderless control of servo drives without additional hardware components* by Ralph Kennel, Oscar Cabral Ferreira, Paweł Szczupak, Wuppertal University, Germany
- *Energy flow control system based on neural compensator in the feedback path for autonomous energy source* by Lech M. Grzesiak and Jakub Sobolewski, Warsaw University of Technology
- *Passivity-based control of single-phase multilevel grid connected inverters* by Marco Lissere, Polytechnic of Bari, Italy

These papers present in an elegant way how Kalman filter, artificial neural network as well as passivity based approach can be effectively applied for drive and power flow control.

I am grateful to Prof. Tadeusz Kaczorek, Editor-in-Chief of the Bulletin of PAS, for his continuous motivation and patience throughout the editorial process. Thanks also to Ewa Kiczko, Editorial Office Secretary of the Bulletin of PAS, who interfaced pleasantly during review process and copyediting. Finally, I would like to thank all contributors and participants of *PELINCEC 2005 Conference* organized by Institute of Control and Industrial Electronics, Warsaw University of Technology – from which all these papers were selected.

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