energies

MDPI

Editorial

Control of Power Electronics Converters and Electric Motor Drives

Federico Barrero [1,*] and Jorge Rodas [2]

[1] Department of Electronic Engineering, University of Seville, 41004 Seville, Spain
[2] Laboratory of Power and Control Systems (LSPyC), Facultad de Ingeniería, Universidad Nacional de Asunción, Luque 2060, Paraguay; jrodas@ing.una.py
* Correspondence: fbarrero@us.es

With the increased emphasis on climate change and reducing harmful emissions in the atmosphere, interest in power electronics converters and electric motor drives has led to significant new developments in areas such as renewable energy systems or electric propulsion. By and large, an electric machine and a power converter are required as a means of propulsion in transportation-related applications, and an electric generator and a power converter are indispensable parts of many wind-energy-based generation systems.

The Special Issue of *Energies* entitled "Control of Power Electronics Converters and Electric Motor Drives" resulted in 11 submissions and seven published papers, confirming the scientific community's interest in the area. Topics of interest for the call included, but were not limited to:

- Linear and nonlinear control of three-phase and multiphase motor drive systems;
- Linear and nonlinear control of power electronics converters;
- New modulation techniques for power converters and electric motor drives.

We believe that the papers published in a Special Issue, collected together in a book, will provide a further impetus to the developments in the field, stimulating new research endeavors in an area that will likely increase importance in the forthcoming years. A summary of the contributions in this Special Issue is presented below.

In [1], a new variation of sliding-mode control, namely discrete terminal super-twisting control, is proposed to regulate the stator current of a six-phase induction machine. Detailed stability analysis of the closed-loop error dynamics using Lyapunov theory is also introduced.

An interesting application of maximum torque per ampere (MPPT) and flux-weakening control of an interior permanent magnet synchronous motor (IPMSM) is proposed in [2]. This paper developed a machine learning-based maximum torque per ampere (MPPT) control using a Petri probabilistic fuzzy neural network with an asymmetric membership function to consider the temperature variation and magnetic saturation of the IPMSM.

An exciting control algorithm is proposed in [3], where the output torque and speed of a high-speed brushless DC (BLDC) motor can be increased using appropriate selection and change of the inverter's pulse width modulation (PWM) control method. The operation and electrical characteristics of various PWM methods of BLDC motors are introduced as well.

In [4] an interesting solution for power factor correction in a welding power source is established and implemented. Due to the high non-linearity of the electric arc, the current controller used to control the current grid needs to show high robustness. Consequently, this paper focuses on digitizing a very robust phase-shift self-oscillating current controller to carry out this task.

A discrete state-space voltage controller for standalone converters with an LC output filter is presented in [5]. This method combines the direct pole-placement technique with a virtual disturbance observer to compensate the effects produced by the load and model mismatches.

Citation: Barrero, F.; Rodas, J. Control of Power Electronics Converters and Electric Motor Drives. *Energies* **2021**, *14*, 4591. https://doi.org/10.3390/en14154591

Received: 26 July 2021
Accepted: 27 July 2021
Published: 29 July 2021

In [6], a remodeled control structure for a single-stage three-phase grid-connected photovoltaic (PV) system is presented. MPPT function is developed using a novel adaptive model-based technique. Moreover, the proposed inverter control avoids the conventional and known cascaded loop structure of the voltage-oriented control (VOC) method by eliminating the outer PI controller.

Finally, in the last part of this Special Issue, an LLC light-emitting diode (LLC LED) driver based on the current-sharing capacitor is presented [7]. The LLC resonant converter is used to step down the high-input voltage provided galvanic isolation to offer a constant current for LEDs.

Author Contributions: The authors contributed equally to this work. Both authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: The Guest Editors would like to take the opportunity to thank the authors who responded to the call. We are also deeply indebted to the reviewers whose input was indispensable to select the published papers and the Special Issue's success. Finally, special thanks must be addressed to the Managing Editor of *Energies* for his excellent support during every stage of this Special Issue's development.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Kali, Y.; Saad, M.; Doval-Gandoy, J.; Rodas, J. Discrete Terminal Super-Twisting Current Control of a Six-Phase Induction Motor. *Energies* **2021**, *14*, 1339. [CrossRef]
2. Lin, F.-J.; Liao, Y.-H.; Lin, J.-R.; Lin, W.-T. Interior Permanent Magnet Synchronous Motor Drive System with Machine Learning-Based Maximum Torque per Ampere and Flux-Weakening Control. *Energies* **2021**, *14*, 346. [CrossRef]
3. Kim, H.-J.; Park, H.-S.; Kim, J.-M. Expansion of Operating Speed Range of High-Speed BLDC Motor Using Hybrid PWM Switching Method Considering Dead Time. *Energies* **2021**, *13*, 5212. [CrossRef]
4. Bellec, Q.; Le Claire, J.-C.; Benkhoris, M.F.; Coulibaly, P. A New Robust Digital Non-Linear Control for Power Factor Correction—Arc Welding Applications. *Energies* **2021**, *14*, 991. [CrossRef]
5. García-Fernández, A.; Doval-Gandoy, J.; Pérez-Estévez, D. Discrete Fundamental AC Voltage Controller for Three-Phase Standalone Converters. *Energies* **2021**, *14*, 650. [CrossRef]
6. Ahmed, M.; Abdelrahem, M.; Harbi, I.; Kennel, R. An Adaptive Model-Based MPPT Technique with Drift-Avoidance for Grid-Connected PV Systems. *Energies* **2021**, *13*, 6656. [CrossRef]
7. Jiang, W.-Z.; Hwu, K.-I.; Shieh, J.-J. LLC LED Driver with Current-Sharing Capacitor Having Low Voltage Stress. *Energies* **2021**, *14*, 112. [CrossRef]