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Editorial

Special Issue on Challenges for Power Electronics Converters

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Power electronics technology is playing an increasingly important role in modern energy utilization systems. Modern power electronics technology is developing to have high frequency, high efficiency, and high reliability. There are still many challenges that need to be overcome. This Special Issue focuses on the latest achievements in ensemble power electronics technology, including the following aspects: novel converter topologies, modeling and control strategies, and fault analysis and diagnosis methods as well as new principal converters that can be used in wireless power transmission as well as in other emerging applications. In order to improve the power quality and power conversion efficiency, various power electronics technologies are being researched.

This Special Issue aimed to collect and present breakthrough research on various kinds of the power electronics converters, including topologies and modulations, modeling and control, fault diagnosis, and power-conversion technologies for wireless power transmission in emerging power-conversion technologies.

A total of ten papers covering various fields of power electronics technologies, including harmonic suppression, TAB series-resonant DC-DC converters, the modeling of AC/DC converters, WPT systems, and fault detection methods, are presented in this Special Issue. Li et al. [1] proposed a method for suppressing the hybrid harmonics of a series-connected 18-pulse rectifier that is expected to be applied in aircraft electrical systems. Rasool et al. [2] proposed a dynamic electro-thermal model to accurately demonstrate the characteristics and to improve the efficiency of a three-phase inverter. Wu et al. [3] proposed a triple-active-bridge resonant DC-DC converter with the ability to carry out topology-level power decoupling and multi-phase-shift-based global optimization modulation. Wu et al. [4] designed a WPT system based on an interleaved boost converter with the advantages of miniaturization and improving system efficiency. Wu et al. [5] proposed a modeling method based on a large-signal model and a grid-current closed-loop control strategy to eliminate the effect of grid voltage harmonics on the grid current. Fan et al. [6] proposed a full-load-range ZVS-isolated three-level DC/DC converter with an active communication auxiliary circuit, and it is expected to be suitable for electric vehicle charging applications. Sun et al. [7] proposed a suppression strategy for broadband sub-synchronous oscillation in a double-fed wind power generation system. Trujillo et al. [8] analyzed the existence and stability of nT-periodic orbits in the boost converter and explained the phenomena found in this research based on the behavior of real applications. Duan et al. [9] proposed a joint estimation method that contains backstepping sliding-mode control and a nonlinear disturbance observer to suppress the disturbance of PMSM. Yao et al. [10] proposed a fault detection and isolation method for sudden load changes in a single-shaft combined-cycle power plant.

Although submissions for this Special Issue have closed, more in-depth research in the field of power electronics continues to address the challenges we face today, such as low power quality, uneven power distribution, and energy crises.

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References

1. Li, Q.; Yin, X.; Meng, F.; He, X.; Wang, G.; Guo, C. Hybrid Harmonic Suppression Method at DC Link of Series-Connected 18-pulse Rectifier. *Appl. Sci.* **2022**, *12*, 5544. [CrossRef]
2. Rasool, H.; el Baghdadi, M.; Rauf, A.M.; Zhaksylyk, A.; D'Hondt, T.; Sarrazin, M.; Hegazy, O. Accurate Electro-Thermal Computational Model Design and Validation for Inverters of Automotive Electric Drivetrain Applications. *Appl. Sci.* **2022**, *12*, 5593. [CrossRef]
3. Wu, F.; Wang, K.; Su, J. TAB Series-Resonant DC-DC Converter and Multi-Phase-Shift Based Global Optimization Modulation. *Appl. Sci.* **2022**, *12*, 6783. [CrossRef]
4. Wu, J.; Zheng, W.; Jiang, Y.; Wang, Y. Design of WPT System Based on Interleaved Boost Converter. *Appl. Sci.* **2022**, *12*, 6994. [CrossRef]
5. Wu, F.; Hu, G.; Su, J. Modeling and compound Closed-Loop Control of Single-Phase Quasi-Single-Stage Isolated AC/DC Converter. *Appl. Sci.* **2022**, *12*, 7886. [CrossRef]
6. Fan, S.; Wen, J.; Duan, J.; Song, Z.; Liu, T. A Full Load Range ZVS Isolated Three-level DC/DC Converter with Active Communication Auxiliary Circuit Suitable for Electric Vehicle Charging Application. *Appl. Sci.* **2022**, *12*, 8325. [CrossRef]
7. Sun, D.; Meng, F.; Shen, W. Study on suppression Strategy for Broadband Sub-Synchronous Oscillation in Doubly-Fed Wind Power Generation System. *Appl. Sci.* **2022**, *12*, 8344. [CrossRef]
8. Trujillo, S.C.; Candelo-Becerra, J.E.; Hoyos, F.E. Existence and Stability of nT-Periodic Orbits in the Boost Converter. *Appl. Sci.* **2022**, *12*, 9565. [CrossRef]
9. Duan, J.; Wang, S.; Sun, L. Backstepping Sliding Mode Control of a permanent Magnet Synchronous Motor Based on a Nonlinear Disturbance Observer. *Appl. Sci.* **2022**, *12*, 11225. [CrossRef]
10. Yao, K.; Wang, Y.; Li, Z.; Li, J.; Wan, J.; Cao, Y. Fault Detection and Isolation of Load Mutation Caused by Electrical Interference of Single-Shaft Combined Cycle Power Plant. *Appl. Sci.* **2022**, *12*, 11472. [CrossRef]