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Fault Diagnosis for Electrical Machines, Power Electronics, and Drives

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Electrical machines are key elements in modern power systems, as they enable the conversion between electrical and mechanical power, and vice versa. Consequently, accurate fault diagnosis is essential to reduce maintenance time, improve reliability, thus ensuring the continuous operation of these devices. With the increasing demand for smart processes and the pursuit of sustainability, electrification is making steady progress. In this context, electrical machines are typically integrated with power electronics, forming what are known as electrical drives. However, the use of power electronic converters introduces additional stress to the electrical and mechanical parts. As a result, the likelihood of faults is increased.

This reprint focuses on emerging and efficient trends in fault diagnosis for electrical machines, power electronics, and their integration within electrical drives. It includes contributions addressing both comprehensive reviews—such as fault diagnosis in aerospace electrical machines—and original research focusing on specific fault types, including inter-turn short circuits, broken rotor bars in induction machines, and demagnetization in permanent magnet synchronous machines. Presented works adopt advanced diagnostic approaches including, among others, online frequency response analysis, symmetrical components analysis, quaternion-based signal processing, and neural network implementations.

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