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Special Issue Reprint

Symmetry/Asymmetry Studies in Modern Power Systems

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This Reprint, “Symmetry/Asymmetry Studies in Modern Power Systems”, presents a cohesive collection of peer-reviewed research that addresses the critical challenges of maintaining system balance and stability in the era of energy transition. As power grids evolve with high penetrations of inverter-based renewables and complex power electronics, traditional concepts of symmetry are being fundamentally redefined. The contributions within this volume collectively advance the understanding and active management of power symmetry amidst inherent asymmetries introduced by variable generation and dynamic loads. The research explores innovative solutions across several key areas, including advanced control strategies for active power balance, optimized integration of renewable energy for inertia support, intelligent equipment operation, and enhanced system protection. By synthesizing advanced computational techniques like deep reinforcement learning and physics-informed modeling with core engineering challenges, this Reprint provides both theoretical insights and practical methodologies. It underscores a paradigm shift towards proactively orchestrating stability, laying a foundation for the design of more resilient, efficient, and sustainable future grids. This collection is an essential resource for researchers and engineers working on the frontline of modern power system analysis and design.

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