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Symmetry and Asymmetry: Shaping the Future of Power Grids

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Message from the Guest Editor

This Special Issue provides a crucial overview of the current research on symmetry and asymmetry in power grids. It aims to explore new methodologies involving theoretical and innovative developments for studying and characterizing the effects of symmetry and asymmetry on power system operation, protection, and control.

Topics of particular interest, which highlight the need for further research, include the following:

- Assessing risks associated with the propagation of disturbances in imbalanced grids;
- Evaluating the impact of asymmetry on modern power electronic-based converters and HVDC links;
- Exploring factors affecting the robustness and vulnerability arising from imbalances within the power grid;
- Characterizing the emergence of complex patterns and oscillations in power grids with spatial and temporal asymmetries;
- Enhancing analytical techniques to analyze and characterize the emergence of complex system behavior;
- Pioneering technological advances to enhance asymmetry detection, opening new avenues for innovation and advancement in the field;
- Integrating distributed energy resources to mitigate asymmetry in generation and demand patterns.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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