

Special Issue on **Advanced Mathematical and Numerical Methods in Control and Optimization for Smart Grids**

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Renewable energy, as a part of smart-grid technology, has brought clean energy into large-scale grid-connected power generation. However, it also causes a series of power quality problems, including voltage fluctuation, voltage deviation, frequency fluctuation, power harmonic, and three-phase imbalance. If this is not effectively controlled, it will result in certain damage, such as those to electrical appliances, and may even cause power grid breakdown.

An increasing number of power electronic devices and new smart-grid technologies are used to ensure a safe, reliable, and high-quality operation of the power grid. However, the effectiveness of these control devices and technologies depends largely on the accuracy of the model, the advancement of control methods, and the numerical optimization of parameters. Therefore, this special issue is focused on recent advances in modeling, numerical analysis, control, and optimization of smart grids with special emphasis on the mathematical problems encountered at any stage of power grid operation, which will be particularly significant.

Although much effort has been made on smart-grid research with a number of influential results obtained, there are still many challenging problems to be solved. Nowadays, advanced mathematical and numerical methods for the control and optimization for smart grids have become a popular research topic with the increase in complexity of the power grid.

The purpose of this special issue is to provide an opportunity for scientists, engineers, and practitioners to showcase their latest mathematical and numerical achievements in power electronics technology used for smart grids.

Potential topics include but are not limited to the following:

- ▶ Characterization of mathematical problems in smart grids
- ▶ Mathematical modeling, numerical analysis, control, and optimization of smart grids
- ▶ Analysis of feasibility and stability of the numerical control methods used for smart grids
- ▶ Particle swarm optimization for numerical solution applied to smart grids
- ▶ Mathematical modeling of power electronics for power transmission and distribution
- ▶ Adaptive Gradient Projection (AGP) algorithm to solve the convex optimization for smart grids
- ▶ Numerical analysis of different topologies on quality improvement devices

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Papers are published upon acceptance, regardless of the Special Issue publication date.

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