# Application of linear and nonlinear control schemes for the stability of smart grid

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**ABSTRACT**

Reliability and controls are essential for preventing outages, load disparity, and synchronization mismatch in a power system. Smart Grid (SG) is a cost-effective solution for minimizing inter-regional variations, optimizing load demand, stabilizing equipment operations, and managing conventional and renewable power sources. However, SGs are still in their infancy, and abrupt changes in demand, grid disruptions, and weather-related variations in renewable energy have a significant impact on their stability. Various hardware and software controls are designed to preserve the stability of SG systems during disturbances and uncertainty. This paper examines the various forms of power system disturbances and their impacts on SG stability. In addition, an overview of the most common linear and nonlinear control strategies applied to SG systems is provided. Finally, advantages, disadvantages, and applications are discussed to highlight the need for more robust operational and control approaches to enhancing SG stability.

**KEYWORDS**

Advantages and disadvantages; Linear control; Nonlinear control; Power system stability; Smart grid

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