

Ensuring Secure Power Grid Operation with High Renewable Penetrations

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Abstract

In the 21 century, power grids worldwide have shown a number of significant new trends. The most important one of them is the wide adoption of renewable resources. In some major power grids, the penetration of wind and solar power has exceeded 50 percent. Such high penetrations of renewables pose some challenges to power grid operations. The system operators need to have better situation awareness and response agilely to the fast changing grid operating conditions, it requires advanced tools to ensure the reliability and security of the power grid. One of such tools is the on-line Dynamic Security Assessment (DSA), which has been or is being adopted by major grid operators in the world.

The author will present the need for, the benefits of, and the current application status of on-line DSA systems, especially the application of such systems in high renewable penetration environments. The issues associated with the successful design and implementation of a DSA system will be discussed. The discussions will be primarily focused on the practical issues for implementing an on-line DSA system, based on the experiences gained from recent applications. Two examples of DSA applications, the ERCOT on-line DSA system and the EirGrid WSAT, will be presented.