

Exploring Probabilistic Models for Transient Stability Analysis of Renewable-Dominant Power Grid

Authors : Phuong Nguyen

Abstract : Along with the ongoing energy transition, the electrical power system is getting more vulnerable with the increasing penetration of renewable energy sources (RES). By replacing a large amount of fossil fuel-based power plants with RES, the rotating mass of the power grid is decreasing drastically, which has been reported by a number of system operators. This leads to a huge challenge for operators to secure the operation of their grids in all-time horizon ranges, from sub-seconds to minutes and even hours. There is a need to revise the grid capabilities in dealing with transient (angle) stability and voltage dynamics. While the traditional approaches relied on deterministic scenarios (worst-case scenarios), there is also a need to cover a whole range of probabilities regarding a wide range of uncertainties coming from massive RES units. To contribute to handle these issues, this paper aims to focus on developing a new analytical approach for transient stability.

Keywords : transient stability, uncertainties, renewable energy sources, analytical approach

Conference Title : ICEPES 2023 : International Conference on Electrical Power and Energy Systems

Conference Location : Singapore, Singapore

Conference Dates : May 04-05, 2023