

Unified Assessment of Power System Reserve-based Reliability Levels

Authors : B. M. Alshammari, M. A. El-Kady

Abstract : This paper presents a unified framework for assessment of reserve-based reliability levels in electric power systems. The unified approach is based on reserve-based analysis and assessment of the relationship between available generation capacities and required demand levels. The developed approach takes into account the load variations as well as contingencies which occur randomly causing some generation and/or transmission capacities to be lost (become unavailable). The calculated reserve based indices, which are important to assess the reserve capabilities of the power system for various operating scenarios are therefore probabilistic in nature. They reflect the fact that neither the load levels nor the generation or transmission capacities are known with absolute certainty. They are rather subjects to random variations and consequently. The calculated reserve-based reliability indices are all subjects to random variations where only expected values of these indices can be evaluated. This paper presents a unified approach to reserve-based reliability assessment of power systems using various reserve assessment criteria. Practical applications are also presented for demonstration purposes to the Saudi electricity power grid.

Keywords : assessment, power system, reserve, reliability

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