DOI: https://doi.org/10.53555/nneee.v4i7.163 Publication URL: https://nnpub.org/index.php/EEE/article/view/163

Probabilistic Based Reliability Assessment Concepts for Composite Power Systems

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How To Cite This Article:
E. A., A. ., S. N., O. ., & F. O., E. (2017). Probabilistic Based Reliability Assessment Concepts for Composite Power Systems. ***Journal of Advance Research in Electrical & Electronics Engineering (ISSN 2208-2395)*****, *4*(7), 09-17. https://doi.org/10.53555/nneee.v4i7.163**

Abstract

The ability of a power system to maintain sufficient supply of electricity at all operating condition reflects its reliability. It is a measure of the systems or components adequacy and security in achieving its role at all times. This work presents system adequacy with respect to reliability following discussions on the basic probability concepts relevant for the reliability assessment of a functional composite power system (hierarchical level II). The concept has been illustrated with a simple composite system of three components; generator, transformer and transmission line. Proceeding on the assumption that components exist in one of the two-state model and not in multi-states, the steady state transition diagram was developed in order to identify system states and the transition rates between states on account of the failure or restoration of a system component. With system states and interstate transition rates identified, state and event probabilities determined, reliability indices that describes the adequacy of such composite systems can be evaluated.

Keyword: Reliability Assessment,, Composite Systems, State, Transition, State transition diagram, Transition rates, Failure rate,, Probability