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"Confiabilidade Nodal em Sistemas de Potência"

One of the main problems in the composite reliability analysis area is the space state dimension: if all power system states were analyzed, the complete evaluation would involve prohibitive computational efforts. Therefore, the available algorithms and techniques for the execution of such studies should be simplified, aiming to reduce the computational efforts. Such simplifications require a deep knowledge of the systems behavior and should be carefully selected, so that incorrect assumptions are avoided. One commonly adopted simplification refers to substation topology representation. Usually it is disregarded and the substation is represented as a simple fictitious electrical node. As a consequence, substation originated failures - which may cause significant impacts on the electric system - are neglected. This Dissertation presents a new methodology that tackles substation originated failures evaluation. This methodology is based on the determination of which terminal elements will become unavailable as a result of each substation component failure occurrence. The methodology comprises 3 fundamental phases: substation elements modeling, in form of simplified state spaces; determination of a equivalent stochastic model for each substation (in this model, each state represents one or more isolated elements connected at the substation); nodal indices calculations. Several applications of the described methodology are presented, including examples using fictitious test-systems and actual stations from the Brazilian power system.