Abstract :

Substations are the weakest link between the source of supply and the customer load points in a power system, because they comprise switching arrangements that would lead to loss of load. Finding the reliability expression of different substation configurations can help design a system with the best overall reliability. This paper presents a computerized and implemented algorithm, based on disjoint sum of product (DSOP) algorithm. The algorithm was synthesized and applied for the first time to the determination of reliability expression of a substation to determine reliability indices and costs of different substation arrangements. It deals with the implementation and synthesis of a new designed algorithm for DSOP implemented using C/C??, incorporating parallel problem solving capability and overcoming the disadvantage of Monte Carlo simulation which is the lengthy computational time to achieve satisfactory statistical convergence of reliability index values. The major highlight of this research being that the time consuming procedures of the DSOP solution generated for different substation arrangements using the proposed method is found to be significantly lower in comparison with the time consuming procedures of Monte Carlosimulation solution or any other method used for the reliability evaluation of substations in the existing literature. This implementation gives the possibility of RBD simulation for different substation configurations in C/C??using their pathset Boolean expressions mapped to probabilistic domain and result in simplest DSOP which is on a one-to-one correspondence with reliability expression. This software tool is capable of handling and modeling a large, repairable system. Additionally, through it’s intuitive interface it can be easily used for industrial and commercial power systems. With simple Boolean expression for a configuration’s RBD inputed, users can easily define a power system utilizing a RBD and, through a fast and efficient built-in simulation engine, required reliability expressions and indexes can be easily obtained.