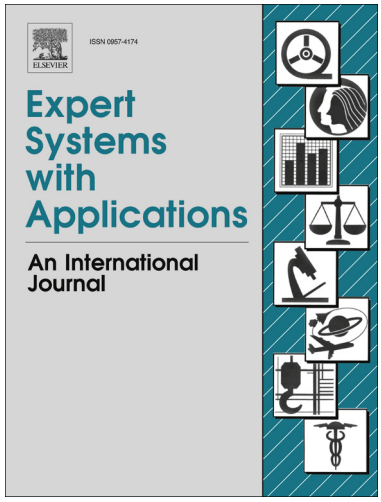

New genetic algorithms for contingencies selection in the static security analysis of electric power systems

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NEW GENETIC ALGORITHMS FOR CONTINGENCIES SELECTION IN THE STATIC SECURITY ANALYSIS OF ELECTRIC POWER SYSTEMS

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Abstract

The importance of a reliable supply of electric power in industrial society is unquestionable. In control centers of electrical utilities, an important task is the Security Analysis, even for those companies that already have the modern smart grids. In this task, a contingency is the operation outage of one or more devices, while contingencies selection is the determination of the most severe contingencies on the system. Despite the current technological advances, an analysis of all possible contingencies is impracticable. In this paper, a method to efficiently perform the selection of multiple contingencies is presented. The issue is modeled as a combinatorial optimization problem and solved by genetic algorithms, developed for this application. A robust method, which considers power flow and voltage, is presented and tested over IEEE-30 test system and over a large real life system, considering double outages of branches. The results showed accuracy close to 100%, when compared with an exact method.

Keywords: Electric Power Systems, Static Security Analysis, Contingency Selection, Genetic Algorithms.

Highlights

- Two genetic algorithms designed for real time security analysis are presented.

- Only the static aspect of the security analysis was considered.

- Satisfactory results were obtained for test systems and large real life systems.