

Heuristic Search Algorithm based on Fuzzy Sets for Feeder Reconfiguration

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In order to deal with the uncertainty of knowledge obtained from human experts, which is remained as the problemistic issue for a rule-based expert system, this study is intended to present a heuristic algorithm based on fuzzy sets for the feeder reconfiguration in automated distribution systems. The expert system developed here is to eliminate the main transformer and/or feeder overload and the voltage violation in the feeder under the normal condition, through the load transfer with the switching actions of normally-open tie and sectionalizing switches in a distribution system.

Each candidate feeder to be loaded can be judged on the basis of several different aspects, including the current load allocated to each feeder, the feeder priority, the fault history of each feeder, and the supporting level of a candidate feeder. Then, each aspect has its own fuzzy weight which represents the relative importance with the piecewise continuous membership function. And, the rating of each aspect for a feeder is also represented by the membership function.

Where individual weights and ratings defined by a group of experts are combined overall, the task is to select a candidate feeder with the highest preference to be loaded, and then transfer some loads in order to solve the system problem.

In addition, the reduction of power loss during the switching operations has been considered, as the secondary objective. We also evaluate the performance of expert systems developed using fuzzy logic, or the test distribution system.