

# Heuristic-Guided Best-First Search Method for Network Reconfiguration of Automated Distribution Systems in Korea

Kyung-Hee Jung · Hoyong Kim · Yunseok Ko  
Korea Electrotechnology Research Institute

## ABSTRACT

This study develops an expert system which solves the problems of the transformer/feeder overloads and the feeder constraints in automated radial distribution systems of Korea, where each feeder is subject to both distribution line capacity limits and voltage drop limits. Then, the objective is to perform the network reconfiguration by switching the tie and sectionalizing switches which minimizes the system violation, while achieving the load balance of the transformers/feeders with the fewer number of switching operations. Since the switching operation in practical systems does not cause the large change in voltage, an approximation method for the feeder reconfiguration is used in order to check the voltage violation, rather than the full ac load flow calculations.

To reduce the search space, an expert system based on heuristic rules is presented, and implemented in AI language Prolog. This system adopts the best-first tree search technique. List processing and recursive programming techniques are then utilized to solve the combinatorial optimization problem. The computational results are also prepared to show the ability of the heuristic algorithm developed.

Key words - network reconfiguration, automated distribution system, heuristic rule, expert system, best-first search