Abstract

Network reconfiguration aims to minimize network real power loss through rearranging the status of open switches. The consumers of the distribution networks need a better voltage profile for efficient operation of various gadgets. This paper thus attempts to develop a new reconfiguration algorithm with an objective of improving the voltage profile of the distribution network without incurring any additional cost for installation of capacitors and tap-changing transformers. The algorithm uses a nature-inspired biogeography based optimization (BBO) that searches for optimal solution through the migration and mutation operators. Test results on a 33 and 69-node distribution networks reveal the superiority of the developed method.

References


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Index Terms

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Keywords

radial distribution networks, network reconfiguration, biogeography based optimization.

Nomenclature BBO — biogeography based optimization; branch-to-node matrix that describes the topological structure of the distribution network; GA — genetic algorithm; habitat suitability index; habitat; vector of load currents; vector of branch currents; equivalent load current at node-; maximum number of iterations for convergence check; number of nodes; number of branches; number of elite habitats; PSO — particle swarm optimization; habitat modification probability; mutation probability; real and reactive power load at node-; resistance and reactance of branch-; maximum species count; suitability index variable; binary variable that represents the topological status of -th branch. It equals ‘1’, if the tie/sectionalizing switch is closed, else its value is set.