

电力系统

应用层次聚类法和蚁群算法的配电网无功优化

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摘要:

为确定无功补偿设备的最佳补偿位置和容量, 提出了基于层次聚类法和蚁群算法的配电网无功优化方法。该方法以有功网损最小建立目标函数, 在约束条件中引入了最优网损微增率准则。运用层次聚类法对灵敏度进行聚类分析, 以确定待补偿点范围, 聚合原则及拆分原则可有效实现聚类, 不受随机性和人为干扰影响。通过改进将蚁群算法确定补偿位置和容量, 能见度因子取为候选节点灵敏度, 使状态转移概率能够随时反映补偿变化情况, 改进蚁群搜索策略可避免盲目补偿。算例结果验证了该方法的有效性。

关键词: 配电网 无功优化 灵敏度 层次聚类法 聚合原则 拆分原则 蚁群算法

Optimization of Reactive Power in Distribution Network With Hierarchical Clustering and Ant Colony Algorithm

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Abstract:

To determine the optimal position and capacity of the compensation device to be installed, an approach to reactive power optimization of distribution network is proposed based on hierarchical clustering and ant colony optimization algorithm (ACOA). The optimal incremental rule of network loss is brought into constrains of the model using minimum network active power loss as objective Function. Utilizing hierarchical clustering algorithm, the clustering analysis on sensitivity is performed to determine the candidate compensation buses. The clustering can be effectively implemented by aggregation principle and separation principle presented in this paper and is not influenced by randomness and man-made interference. The optimal position and capacity of the compensation device to be installed is determined by improving ACOA. The sensitivity of candidate bus is chosen as the visibility factor to achieve the aim that the state transition probability can reflect the variation of compensation momentarily and more suitable search strategy is put forward to avoid unquestioning compensation. The effectiveness of the proposed method is verified by results of calculation example.

Keywords: distribution network reactive power optimization sensitivity hierarchical clustering algorithm aggregation principle separation principle ant colony algorithm

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