

电力系统

基于网络拓扑分析的配电网潮流节点分析法

孟晓芳¹, 刘文宇¹, 朴在林², 王力³

1. 沈阳农业大学 信息与电气工程学院, 辽宁省 沈阳市 110161; 2. 七台河电业局, 黑龙江省 七台河市 154600

摘要:

利用网络拓扑分析方法及基尔霍夫电流定律, 提出一种复杂配电网的潮流计算方法, 考虑了线路、并联电容器、负荷及PV节点的模型, 计及了线路的充电效应、PV节点以及电容器和负荷的影响。该算法对节点和支路编号的要求不高, 提高了节点和支路编号的灵活性。采用该算法对IEEE 30节点系统进行了仿真计算, 结果表明, 该算法是计算具有环网、PV节点及充电效应的复杂配电网潮流的一种有效方法。

关键词:

A Nodal Analysis Method of Load Flow in Distribution Network Based on Network Topology Analysis

MENG Xiao-fang¹, LIU Wen-yu¹, PIAO Zai-lin¹, WANG Li²

1. College of Information and Electrical Engineering, Shenyang Agricultural University, Shenyang 110161, Liaoning Province, China; 2. Qitaihe Electric Power Bureau, Qitaihe 154600, Heilongjiang Province, China

Abstract:

By use of network topology analysis and Kirchoff's current law, a load flow calculation method for complex distribution network is proposed in which the models of transmission lines, shunt capacitors, loads and PV nodes are considered as well as the influences of transmission lines' charging effect, PV nodes, capacitors and loads are taken into account. There is no much demand for the numbering of nodes and branches, thus lines and nodes can be numbered flexibly. The proposed algorithm is verified by IEEE 30-bus system, simulation results show that the proposed algorithm can be utilized in the load flow calculation of complex distribution network where looped network, PV nodes and charging effect exist.

Keywords: Kirchoff's current law (KCL)

收稿日期 2009-04-29 修回日期 2010-01-21 网络版发布日期 2010-04-14

DOI:

基金项目:

通讯作者: 孟晓芳

作者简介:

作者Email: xfmeng123@126.com

参考文献:

- [1] 王绵斌, 谭忠富, 曹福成, 等. 考虑不确定性因素的需求侧管理成本效益分析模型[J]. 电网技术, 2006, 30(14): 59-63.
- [1] 蔡中勤, 郭志忠. 基于逆流编号法的辐射型配电网牛顿法潮流[J]. 中国电机工程学报, 2000, 20(6): 13-16. Cai Zhongqin, Guo Zhizhong. Newton load flow for radial distribution network based on upstream labeling technique[J]. Proceedings of the CSEE, 2000, 20(6): 13-16(in Chinese).
- [2] 索南加乐, 李怀强, 罗云照, 等. 一种新的配网潮流常Jacobian牛顿算法[J]. 西安交通大学学报, 2002, 36(12): 1222-1226. Suonan Jiale, Li Huaiqiang, Luo Yunzhao, et al. Novel Newton method with constant Jacobian matrix for distribution systems[J]. Journal of Xi'an Jiaotong University, 2002, 36(12): 1222-1226(in Chinese).
- [3] 颜伟, 刘方, 王官洁, 等. 辐射型网络潮流的分层前推回代算法[J]. 中国电机工程学报, 2003, 23(8): 76-80. Yan Wei, Liu Fang, Wang Guanjie, et al. Layer-by-layer back/forward sweep method for radial distribution load flow[J]. Proceedings of the CSEE, 2003, 23(8): 76-80(in Chinese).
- [4] 刘健, 马莉, 韦力, 等. 复杂配电网潮流的降规模计算[J]. 电网技术,

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(357KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

本文作者相关文章

PubMed

2004, 28(8): 60-63,76. Liu Jian, Ma Li, Wei Li, et al. Analysis of large scale distribution network with reduced calculation[J]. Power System Technology, 2004, 28(8): 60-63,76(in Chinese). [5] 邵黎, 谢开贵, 何潇. 用于复杂配电网潮流计算和可靠性评估的树状链表和递归搜索方法[J]. 电网技术, 2007, 31(13): 39-43. Shao Li, Xie Kaigui, He Xiao. Dendroidal link table and recursion search technique for power flow calculation and reliability estimation of complex distribution networks[J]. Power System Technology, 2007, 31(13): 39-43(in Chinese). [6] 彭谦, 张弘鲲, 刘海燕, 等. 基于集抄系统的配电网潮流计算方法[J]. 电网技术, 2007, 31(7): 69-72. Peng Qian, Zhang Hongkun, Liu Haiyan, et al. Load flow algorithm for distribution network based on centralized meter reading system[J]. Power System Technology, 2007, 31(7): 69-72(in Chinese). [7] 张学松, 柳焯, 于尔铿, 等. 配电网潮流算法比较研究[J]. 电网技术, 1998, 22(4): 45-49. Zhang Xuesong, Liu Zhuo, Yu Erkeng, et al. A comparison on power flow calculation methods for distribution network[J]. Power System Technology, 1998, 22(4): 45-49(in Chinese). [8] 王守相, 江兴月, 王成山. 含分布式电源的配电网故障分析叠加法[J]. 电力系统自动化, 2008, 32(5): 38-42. Wang Shouxiang, Jiang Xingyue, Wang Chengshan. A superposition method of fault analysis for distribution systems containing distributed generations[J]. Automation of Electric Power Systems, 2008, 32(5): 38-42(in Chinese). [9] 杨旭英, 段建东, 杨文宇, 等. 含分布式发电的配电网潮流计算[J]. 电网技术, 2009, 33(18): 140-143. Yang Xuying, Duan Jiandong, Yang Wenyu, et al. Power flow calculation based on power losses sensitivity for distribution system with distributed generation[J]. Power System Technology, 2009, 33(18): 140-143(in Chinese). [10] Zhang Fang, Cheng Carols. A modified Newton method for radial distribution system power flow analysis[J]. IEEE Trans on Power Systems, 1997, 12(1): 389-397. [11] Shirmohammadi D, Hong H W, Semlyen A, et al. A compensation-based power flow method for weakly meshed distribution and transmission networks[J]. IEEE Trans on Power Systems, 1988, 3(2): 753-762. [12] Haque M H. Efficient load flow method for distribution systems with radial or mesh configuration[J]. IEE Proceedings C: Generation, Transmission and Distribution, 1996, 143(1): 33-38. [13] Rajicic D, Ackovski R, Taleski R. Voltage correction power flow[J]. IEEE Trans on Power Delivery, 1994, 9(2): 1056-1062. [14] Luo G X, Semlyen A. Efficient load flow for large weakly meshed networks[J]. IEEE Trans on Power Systems, 1990, 5(4): 1309-1316. [15] Vempati N, Shoultz R R, Chen M S, et al. Simplified feeder modeling for load flow calculations[J]. IEEE Trans on Power Systems, 1987, 2(1): 168-174. [16] Chiang Hsiao-Dong, Wang Jin-Cheng, Miu Karen Nan. Explicit loss formula, voltage formula and current flow formula for large-scale unbalanced distribution systems[J]. IEEE Trans on Power Systems, 1997, 12(3): 1061-1067. [17] Gohokar V N, Khedkar M K, Dhole G M. Formulation of distribution reconfiguration problem using network topology: a generalized approach[J]. Electric Power Systems Research, 2004, 69(2-3): 305-310. [18] 吴文传, 张伯明. 配网潮流回路分析法[J]. 中国电机工程学报, 2004, 24(3): 67-71. Wu Wenchuan, Zhang Boming. Study on loop analysis theorem of distribution system power flow[J]. Proceedings of the CSEE, 2004, 24(3): 67-71(in Chinese). [19] 张伯明, 陈寿孙, 严正. 高等电力网络分析[M]. 北京: 清华大学出版社, 2007: 15-19,325-328. [20] 乐全明, 吕飞鹏, 郁惟镛, 等. 形成节点阻抗矩阵的节点编号顺序优化算法[J]. 电网技术, 2006, 30(6): 88-91. Yue Quanming, Lü Feipeng, Yu Weiyong, et al. An optimal node numbering order algorithm to build bus impedance matrix[J]. Power System Technology, 2006, 30(6): 88-91(in Chinese). [21] Goswami S K, Basu S K. Direct solution of distribution systems[J]. IEE Proceedings C: Generation, Transmission and Distribution, 1991, 138(1): 78-88. [22] 王守相, 王成山. 配电系统节点优化编号方案比较[J]. 电力系统自动化, 2003, 27(8): 54-58. Wang Shouxiang, Wang Chengshan. Comparative study of optimal node indexing schemes for distribution systems[J]. Automation of Electric Power Systems, 2003, 27(8): 54-58(in Chinese).

本刊中的类似文章