

电力系统

含分布式电源的配电网电压暂降评估

代双寅, 韩民晓, 严稳莉

华北电力大学 电气与电子工程学院, 北京市 昌平区 102206

摘要:

本文运用蒙特卡洛法研究了含分布式电源的配电网电压暂降评估。首先分别建立了同步机型DG和逆变器型DG的仿真模型。然后基于EMTDC/PSCAD运用蒙特卡洛法对含分布式电源的典型配电网进行了仿真, 采用SARFIx指标作为评价各节点电压暂降的指标。结合多个仿真算例分析了DG的类型、控制策略、出力和接入位置对电压暂降的影响。仿真结果表明, 逆变器型DG的接入能够降低配电网电压暂降的发生频次, DG的控制策略、出力和接入位置都会对电压暂降产生一定的影响, 这为配置分布式电源和缓解电压暂降问题提供了参考。

关键词: 电压暂降 分布式电源 配电网 蒙特卡洛法

Voltage Sag Assessment for Distribution Network Containing Distributed Generation

DAI Shuangyin ,HAN Minxiao ,YAN Wenli

School of Electrical and Electronic Engineering, North China Electric Power University, Changping District, Beijing 102206, China

Abstract:

The voltage sag of distribution network containing distributed generation (DG) is assessed. Simulation models for synchronous machine-based DG and inverter-based DG are built respectively; then based on EMTDC/PSCAD and by use of Monte Carlo method the typical distribution network containing DGs are simulated, and the system average root mean square frequency index are utilized as the indices to evaluate voltage sag at different nodes. Based on a lot of simulation examples, the influences of the types, control strategies, output power and grid-connected positions of DGs on voltage sag are analyzed. Simulation results show that connecting inverter-based DG to power grid can decrease the frequency of occurrence of voltage sag in distribution network; the control strategy, output power and grid-connected position of DGs exert influences on voltage sag. This conclusion is available for reference in the configuration of DGs and the mitigation of voltage sag.

Keywords: voltage sag distributed generation (DG) distribution network Monte-Carlo method

收稿日期 2010-09-27 修回日期 2010-10-18 网络版发布日期 2011-07-11

DOI:

基金项目:

美国能源基金会资助项目(G-0911-11768)。

通讯作者: 代双寅

作者简介:

作者Email: daishuangyin@163.com

参考文献:

[1] 裴玮, 盛鹁, 孔力, 等. 分布式电源对配网供电电压质量的影响与改善[J]. 中国电机工程学报, 2008, 28(13): 152-157. Pei Wei, Shen Kun, Kong Li, et al. Impact and improvement of distributed generation on distribution network voltage quality[J]. Proceedings of the CSEE, 2008, 28(13): 152-157(in Chinese). [2] 梁才浩, 段献忠. 分布式发电及其对电力系统的影响[J]. 电力系统自动化, 2001, 25(12): 53-56. Liang Caihao, Duan Xianzhong. Distributed generation and its impact on power system [J]. Automation of Electric Power Systems, 2001, 25(12): 53-56(in Chinese). [3] 孙瑜, Math B, Graham A. 孤岛状态下含分布式电源的配电系统可靠性分析[J]. 电网技术, 2008, 32(23): 77-81. Sun Yu, Math B, Graham A. Reliability analysis of islanded distribution systems with distributed energy

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(232KB)
- ▶ [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

- ▶ 电压暂降
- ▶ 分布式电源
- ▶ 配电网
- ▶ 蒙特卡洛法

本文作者相关文章

PubMed

recourses[J]. Power System Technology, 2008, 32(23): 77-81(in Chinese). [4] Bollen M H J. Understanding power quality problems: voltage sags and interruptions[M]. New York: IEEE Press, 2000: 139-253. [5] Juan A M, Jacinto M A. Voltage sag studies in distribution networks-part III: voltage sag index calculation[J]. IEEE Trans on Power Delivery, 2006, 21(3): 1689-1697. [6] 宋云亭, 郭永基, 张瑞华. 电压骤降和瞬时供电中断概率评估的蒙特卡罗仿真[J]. 电力系统自动化, 2003, 27(18): 47-51. Song Yunting, Guo Yongji, Zhang Ruihua. Probability assessment of voltage sags and momentary interruption based on Monte-Carlo simulation[J]. Automation of Electric Power Systems, 2003, 27(18): 47-51(in Chinese). [7] Juan A M, Jacinto M A. Voltage sag stochastic prediction using an electromagnetic transients program[J]. IEEE Trans on Power Delivery, 2004, 19(4): 1975-1982. [8] 李妍, 余欣梅, 熊信良, 等. 电力系统电压暂降分析计算方法综述[J]. 电网技术, 2004, 28(14): 74-78. Li Yan, Yu Xinmei, Xiong Xinyin, et al. A survey on calculation and analysis methods of voltage sag [J]. Power System Technology, 2008, 28(14): 74-78(in Chinese). [9] 陶顺, 肖湘宁, 刘晓娟. 电压暂降对配电系统可靠性影响及其评估指标的研究[J]. 中国电机工程学报, 2005, 25(21): 63-69. Tao Shun, Xiao Xiangning, Liu Xiaojuan. Study on distribution reliability considering voltage sags and acceptable indices[J]. Proceedings of the CSEE, 2005, 25(21): 63-69(in Chinese). [10] 易杨, 张尧, 钟庆. 基于蒙特卡罗方法的大型电力用户电压暂降评估[J]. 电网技术, 2008, 32(6): 58-60. Yi Yang, Zhang Yao, Zhong Qing. Assessment of voltage sags in large power consumer based on Monte Carlo method[J]. Power System Technology, 2008, 32(6): 58-60(in Chinese). [11] 赵岩, 胡学浩. 分布式发电对配电网电压暂降的影响[J]. 电网技术, 2008, 32(14): 5-9. Zhao Yan, Hu Xuehao. Impacts of distributed generation on distribution system voltage sags[J]. Power System Technology, 2008, 32(14): 5-9(in Chinese). [12] Milanovic J V, Ali H, Aung M T. Influence of distributed wind generation and load composition on voltage sags[J]. IET Generation Transmission and Distribution, 2007, 1(1): 13-2. [13] 梁有伟, 胡志坚, 陈允平. 分布式发电及其在电力系统中的应用研究综述[J]. 电网技术, 2003, 27(12): 71-75. Liang Youwei, Hu Zhijian, Chen Yunping. A survey of distributed generation and its application in power system[J]. Power System Technology, 2003, 27(12): 71-75(in Chinese). [14] IEEE Std 1547TM—2003 Standard for interconnecting distributed resources with electric power systems [S]. New York: IEEE, 2003. [15] 郭永基. 电力系统可靠性分析[M]. 北京: 清华大学出版社, 2003: 72-123. [16] Brooks D L, Roger C D, Marek W, et al. Indices for assessing utility distribution system RMS variation performance[J]. IEEE Trans on Power Delivery, 1998, 13(1): 254-259.

本刊中的类似文章

1. 姚诸香 张辉 颜伟 张婧.三相四线制配电网的潮流模型与算法[J]. 电网技术, 2009,33(17): 113-118
2. 江洁 王主丁 张宗益 李宏伟.基于有效生成初始种群的配电网无功规划优化遗传算法[J]. 电网技术, 2009,33(8): 60-65
3. 邱建 蔡泽祥 李爱民 刘敏 蔡莹 付轲.基于N-1准则的各自投投退控制策略 [J]. 电网技术, 2009,33(8): 66-71
4. 孙鸣 余娟 邓博.分布式发电对配电网线路保护影响的分析[J]. 电网技术, 2009,33(8): 104-107
5. 丁晓群, 王 宽, 沈茂亚, 王仲达, 周振凯, 邱 婕.结合模态分析的遗传算法在配电网无功规划中的应用 [J]. 电网技术, 2006,30(17): 47-50
6. 陈玥云, 覃 剑, 王 欣, 陈树勇, 张冰冰, 于玉泽.配电网故障测距综述[J]. 电网技术, 2006,30(18): 90-93
7. 林霞|陆于平|王联合|刘玉欢 .含分布式电源的配电网智能电流保护策略[J]. 电网技术, 2009,33(6): 82-89
8. 吴正骅 程浩忠 厉达 姚白沙 董震威.基于负荷密度比较法的中心城区典型功能区中压配电网接线方式研究[J]. 电网技术, 2009,33(9): 24-28
9. 王鲸涛 谢开贵 曹侃 冯怡.配电网开关优化配置研究现状与展望[J]. 电网技术, 2008,32(16): 47-52
10. 张慧芬|潘贞存.配电网故障自动定位的一种改进算法[J]. 电网技术, 0,(): 0-
11. 涂有庆 吴政球 黄庆云 刘杨华 王坤 .基于贡献因子的含分布式发电配电网网损分摊[J]. 电网技术, 2008,32(20): 86-89
12. 孙瑜|Math Bollen|Graham Ault .孤岛状态下含分布式电源的配电系统可靠性分析[J]. 电网技术, 2008,32(23): 77-81
13. 李天云 王飞 祝磊 李建军 .基于固有模态能量熵的配电网单相接地故障选线新方法[J]. 电网技术, 2008,32(26): 128-132
14. 李惠玲 盛万兴 孟晓丽 .基于改进小生境遗传算法的配电网全网无功优化[J]. 电网技术, 2009,33(4): 34-37
15. 邓桂平|孙元章|徐箭 .应用综合负荷模型的电容补偿配电网感应电动机起动方法[J]. 电网技术, 2009,33(4): 61-64