

智能电网

微电网非破坏性无盲区孤岛检测技术

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摘要: 传统无源孤岛检测方法存在检测盲区, 有源孤岛检测方法可减小或消除检测盲区, 但其机制是将系统电压幅值或频率偏离至故障运行范围, 从而判断孤岛发生, 其本质属于破坏性孤岛检测方法。然而, 微电网应用场合需要无盲区且非破坏性孤岛检测方法。为了解决该问题, 提出一种基于负序电压正反馈(negative-sequence voltage positive feedback, NSVVPF)的孤岛检测方法, 并根据IEEE Std.1547测试标准对提出的方法进行理论分析及仿真研究。结果表明, 在IEEE Std.1547规定的最差情况下, 提出的NSVVPF孤岛检测方法在电压处于正常运行范围的情况下仍可快速有效地检测到孤岛的发生, 从而实现了非破坏性无盲区孤岛检测。此外, 该文提出的孤岛检测方法在电网单相和两相断路情况下仍然有效, 最后探讨了如何防止伪孤岛的问题。

关键词: 微电网 非破坏性孤岛检测 检测盲区 伪孤岛

Non-devastating Islanding Detection for Microgrids Without Non Detection Zone

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Abstract: Conventional passive islanding detection methods have disadvantages of non-detection zone (NDZ). Active ones can reduce or eliminate NDZ, but their operation mechanism is forcing the voltage into the fault range, which is a devastating islanding detection approach. However, the non-devastating islanding method without NDZ is desirable for microgrid applications. A novel islanding detection method based on negative-sequence voltage positive feedback (NSVVPF) is proposed. Theoretical analysis and simulations are conducted according to IEEE Std.1547, and the results indicate that the proposed method can detect the islanding rapidly in the worst case. Its unique feature lies in both the non-devastation and no NDZ. In addition, the islanding detection under single-phase and two-phase break faults is discussed, where the proposed method is still effective. Finally, precaution of the false islanding trip is discussed.

Keywords: microgrid non-devastating islanding detection non detection zone false islanding

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