論　文　要　旨
Thesis Abstract

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主論文題名　（Title）

ISLANDING DETECTION AND POWER QUALITY ANALYSIS IN MICRO-GRID

内容の要旨　（Abstract）

The micro-grid (MG) has been developed based on the important concept of distributed generation (DG) with high penetration of renewable energy integrated with energy storage systems (ESSs). MGs can operate in both grid-connected and islanding mode. Therefore, this thesis focuses on autonomous multi-islanded entities and the seamless reconnection to the main grid as the self-healing ability of the future power system. The minimization of power quality issues (mainly that of voltage, frequency, and harmonics) in such entities based on controllers, with or without intercommunication, is also an important part of this thesis. The future power system, with the significant penetration of distributed generations (DGs), can rapidly respond to any problem occurring within it by separating into autonomous islanded entities to prevent the disconnection of DGs. As a result, high-quality and continuous power is supplied to consumers. The future research that is necessary for the realization of the future power system is discussed.

Besides, the emergence of Distributed Generation (DG) in the electric system has brought about the appearance of the islanding phenomenon. In AC networks, there are a lot of Islanding Detection Methods (IDMs) have been studied. However, not too much IDMs in DC networks have been published because of the absence of frequency and reactive power. The active IDM based on injected perturbation signal and rate of change of power output is proposed. This IDM can detect islanding condition not only in the worst case (the power of the load and PV are equal) but also in another case (the power of load is greater than the power of PV). It can be applied to both single and multi-PV operation scenarios. Also, the cancellation problem is analyzed and the solution is proposed to solve this problem. Besides, the effectiveness of the proposed method, the cancellation problem, and the solution are verified by simulation in Matlab/Simulink.

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