DEVELOPMENT OF HYBRID ISLANDING DETECTION TECHNIQUE FOR DISTRIBUTED POWER GENERATION

Master of Science dissertation

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Abstract

The utilization of distributed generation (DG) units is rapidly increasing in power system and questions are raised regarding their effect on the system, energy management and protection policies. DG can provide in some cases a significant art of the load energy requirements. Islanding operation of DG usually occur when the main utility supply is interrupted due to several contingencies (inrush currents, faults, etc) while the DG is still supplying power to the distribution network at a sustained voltage and frequency. These conditions have negative impacts on the system protection, restoration, operation and management and could be fatally harmful to line workers and power system facilities. IEEE Std. 1547TM-2003 & IEEE Std.929-2000 require that islanded DG system be shut down within a specified time. Therefore, it is necessary to detect the presence of this condition and switch off the DG from distribution network or isolate the DG with its load from the rest of the system.

Conventional detection methods for islanding conditions are based on monitoring several parameters such as voltage magnitude, phase, displacement, frequency change, voltage unbalance (VU) and total harmonic distortion (THD). However, in case of small changes in loading for DG, the contingency will be masked by normal operating condition. Conventional methods usually will not detect such an islanding condition.

Among the existing islanding detection techniques, two techniques, namely the positive feedback (PF) technique and voltage unbalance and the total harmonic distortion (VU/THD) technique are most promising ones. However, both of these tecliniques have their own flaws. In this thesis a new technique is proposed that combines the principles of those two to obtain a hybrid islanding detection technique for synchronously rotating DGs. Simulation results show that the proposed hybrid technique is more effective than each of the above schemes.

DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

UOM Verified Signature

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January 2008

I endorse the declaration by the candidate.

UOM Verified Signature

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