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Analysis of Active Islanding Methods for Single phase Inverters

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The condition of "Islanding" in Distributed Generators (DGs) is an electrical phenomenon that occurs when the energy supplied by the power grid is interrupted due to various factors and the DGs continue energizing some or the entire load. Thus, the power grid stops controlling this isolated part of the distribution system, which contains both loads and generation. Therefore, islanding operation of grid connected inverters may compromise security, restoration of service and the reliability of the equipment.

In the case of several Distributed Generation Systems connected to a low-voltage power grid, it is possible that the amount of energy generated by the distributed system agrees with the amount of energy consumed by the loads on the grid. Under this situation, there is no energy flow towards the grid and the distributed systems may fail to detect a possible power grid disconnection, so that the DGs may continue feeding the loads leading to an "Islanding" condition. In addition, when the islanding condition happens, there is a primary security condition which forces the generator system to disconnect from the de-energized grid without taking into account the connected loads.

The "islanding" effect in inverters may result from a failure detected by the grid and the consequent switch opening, accidental opening of the electrical supply because of equipment failure, sudden changes in the electric distribution systems and loads, intentional disconnection for maintenance services either on the network or in the service, human error, vandalism or acts of nature.

There are many reasons why islanding should be anticipated in the distributed generation systems connected to the grid. The main reasons are safety, liability and maintenance of the quality of the supplied energy.

For the above reasons, islanding detection is an indispensable feature that should be taken into account in Distributed Generation Systems and different algorithms have been implemented to solve it. Islanding detection techniques can be divided into remote and local ones, and also into passive and active techniques.

Active techniques resident in the inverter, which are discussed in this article, introduce disturbances in the output of the inverter in order to affect a parameter that comes out of range in an islanding situation.
This paper is organized as follows: first, a description of the sample DG system connected to the grid; Second, different active resident methods will be presented; Next, these methods will be simulated with RLC loads according to the standards. Finally, some conclusions are presented.