

EXPANSION OF DYNAMIC SIMULATION MODEL FOR A DISTRIBUTED GENERATOR UNINTENTIONAL ISLANDING DETECTION SCHEME

[Login \(/login\)](#)

[IUPUI ScholarWorks Repository](#)

→

[Theses, Dissertations, and Doctoral Papers](#)

→

[Electrical & Computer Engineering Department Theses and Dissertations](#)

→

[View Item](#)

EXPANSION OF DYNAMIC SIMULATION MODEL FOR A DISTRIBUTED GENERATOR UNINTENTIONAL ISLANDING DETECTION SCHEME

[Vasquez, Diana C.](#)



Name: dvasquezthesis.pdf

Size: 1.069Mb

Format: PDF

[View/Open](#)

Permanent Link: <http://hdl.handle.net/1805/2246>

Date: 2010-08-25

Committee Chair: [Rovnyak, Steven](#)

Committee: Rizkalla, Maher

Members: Chen, Yaobin

Degree: M.S.E.C.E.

Degree Year: 2010

Department: Electrical & Computer Engineering

Grantor: Purdue University

Keywords: [islanding](#)

LC Subjects: [Distributed generation of electric power](#); [Distributed resources \(Electric utilities\)](#)

Abstract:

The interconnection of distributed resources requires specific voltage regulation, monitoring, protective relaying, power quality, and islanding detection. For this reason IEEE established standard IEEE 1547 that ensures the compliance with such requirements and it will help formulate technical specifications for grid interconnection with Distributed Generator (DG) resources. In search of meeting the IEEE 1547 standard requirement of detecting unintentional islanded operation, there has been ongoing research to develop anti-islanding methods that can detect the different changes that can occur when the grid is disconnected. A team of Electrical Engineering faculty at Indiana University Purdue University Indianapolis has worked previously on testing a DG unintentional Islanding Detection Scheme. This scheme uses an active anti-islanding

method in which a small 1 Hz perturbation signal is added into the DG system and it helps detect when the grid is disconnected. The scheme uses the premise that a frequency deviation caused by perturbation to the system is smaller when the grid is connected than when it is in an island. In an initial dynamic simulation model for the islanding detection scheme, a two-machine microgrid system is used to explore frequency and voltage responses when the grid is disconnected. In this thesis, the two-machine microgrid is expanded to a ten-machine system so it can be shown that the frequency deviation caused by a perturbation signal is much smaller when the grid is connected even for a larger DG network. The 1 Hz component of the DG electrical frequency in a multiple machine microgrid system is also calculated in this thesis. This project was conducted in different stages. First, it was necessary to calculate the steady state power flow and electric power of a three-machine system and update the two-machine MATLAB program with the necessary changes. After making the changes, it was necessary to simulate the system and adjust the inertia of the machine that represents the grid to ensure that the simulation output was close in magnitude to previous testing results. When the three-machine system was successfully generated, a brand new program was created so a multiple machine system could be simulated. Then the multiple machine program was used to simulate and experiment with up to a ten-machine system. Finally a program to calculate the 1 Hz component of the DG electrical frequency was generated and used to show that the magnitude squared of the 1 Hz component is inversely proportional to the number of machines connected to the system. These last findings will later help set the threshold for islanding detection appropriately for different numbers of DG.

Description:

Indiana University-Purdue University Indianapolis (IUPUI)

This item appears in the following Collection(s)

[Electrical & Computer Engineering Department Theses and Dissertations \(/handle/1805/2087\)](/handle/1805/2087)



[Show Statistical Information \(#\)](#)

My Account

[Login](#)

[Register](#)

Statistics

[Most Popular Items](#)

[Statistics by Country](#)

[Most Popular Authors](#)

[About Us \(/page/about\)](/page/about) | [Contact Us \(/contact\)](/contact) | [Send Feedback \(/feedback\)](/feedback)

[_\(/htmlmap\)](/htmlmap)

FULFILLING *the* PROMISE

[Privacy Notice \(http://ulib.iupui.edu/privacy_notice\)](http://ulib.iupui.edu/privacy_notice)



Copyright (<http://www.iu.edu/copyright/index.shtml>) ©2015

The Trustees of Indiana University (<http://www.iu.edu/>),

Copyright Complaints (<http://www.iu.edu/copyright/complaints.shtml>)