

Control for Grid Connected and Intentional Islanding Operation of Distributed Power Generation

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Abstract - Intentional islanding is a very important aspect while we concern about the system reliability in situations when the electrical connection between the micro-grid and the electrical network of the transmission line is loss. In this paper an innovative approach method for intentional islanding is proposed in micro-grid and nano-grids. The important and practical priorities issue concerning such as load, less distortion are taken into account. The power flow in the intentional islanding should be always taken into account while we consider the transmission network. Here, the control for grid connected is done with the help of DG

Key Words: DG- Distributed Generation, grid connected operations Intentional islanding.

1. INTRODUCTION

The current model of distributed generation for electrical generation is determine by the power plants. The system of the centralized power plant has many disadvantages. Electrical utilities are becoming more and more stressed since existing transmission and distribution system are facing there operating constraints with the growing load. Distributed generation has become an important factor while considering intentional islanding to the problem. Intentional islanding describe the condition in which a micro grid or a portion of a power grid which consist of load and DG system is isolated from the power system. In this situation it is important for the micro grid to continue to provide adequate power to the load. When the micro grid is cut-off from the main grid each DG inverter system must detect this islanding situation and must switch to the voltage control mode. This power proposed an intelligent load shedding algorithm for intentional islanding for the grid connection. The software which we going to simulated in this model is MATLAB/Simulink

1.1 The Distribution Generation Concept

The DG is a small modular electricity generator located close to the customer load connections point that means DG are the small size power plant that can be intended as a small size power plant that are design to be installed at operated load center. For effectively and efficiently connected any of the DG sources to the existing system power electronic based system needs to be develop for running the project, Finally, complete content and organizational editing before formatting. Please

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1.2 Benefits associated with DG

In Distribution system DG can provide benefit for the consumer as well as for the utilities specially in the sites where there are deficiencies in the transmission system.

Some of the benefits of the DG's are:-

- a) Energy Efficiency.
- b) Reduce Transmission and Distribution investment.
- c) Minimization of electrical losses.
- d) Network voltage support.
- e) Quality of supply improvement.
- f) New market opportunities and enhance industrial competitiveness.
- g) Reduction of energy cost.
- h) Interface with AC system.
- i) Increase power factor.
- j) Decrease in harmonics.
- k) Constant frequency.
- l) Instantaneous power tracking.

Synchronization of grid

2. Intentional Islanding

Intentional islanding is a islanding phenomenon in an electrical condition in power distribution network in which power is distribution with the help of distributed generation for a zone or an area which get isolated from the grid supply due to any reason. This implies that the distribution utilities loss control over supply and the islanding is not stable.

In other word, when the amount o power generated by multiple DG units connected to the grid side, the power flow should be constant.

The concept of islanding detection is based on monitoring the DG units. The output parameters and the grid parameters changes sometimes through which we can conclude that the islanding has occurred. On that basis islanding detection techniques can be categorized into remote and local techniques.

3. Methodology

1. Islanding is a condition where the DG remains operating in the distribution system with the utility disconnected. In the past years, several islanding detection methods have been proposed and the detection methods can be categorized into two main groups: Passive and Active methods.
2. Passive methods depends on measuring system parameters and then thresholds are set to this parameters to differentiate between an islanding and non-islanding condition. Active method directly interact with the power system operation by introducing perturbations in the inverter output. The most commonly used of Over/Under frequency.
3. Here in this project control is designed both for grid connected operation and the other for intentional islanding operation.
4. An algorithm for the detection of islanding is presented which was responsible for the switch between the two controllers and also re-closure algorithm which can uses the DG to re-synchronize itself with the grid is also designed.
5. Thus the project summarizes the traditional independent inverter and grid connected inverter control strategy, combining the distributed power and micro grid inverter characteristics, a suitable micro grid inverter control strategy is put forward. switching between Grid-connected mode and Grid-disconnected mode for micro grid inveter has been studied.
6. On the Grid-disconnected operation micro grid inverter supplies the important loads that ensured load voltage and frequency stability.
7. Micro grid inverter can smoothly switch between Grid-connected operation and Grid-disconnected operation, and switching operation of the system has good performance. The system controller design is simple, practical and efficient, easy to implement. In this project we have considered different test cases. The simulation results show that the proposed control methods is feasible and effective.

4. Planning of work

Micro grid is defined as a cluster of the distributed generators(DG) such as renewable energy sources that supply electrical energy. The connection of the micro grid is parallel with the main grid. When micro grid I isolated from the remainder of utility system, it is said to be in intentional islanding mode. In this mode, DG inverter system operates in voltage control mode to provide constant voltage to the local load.

During grid connected mode, the micro grid operates in a current control mode to supply present power to the grid.

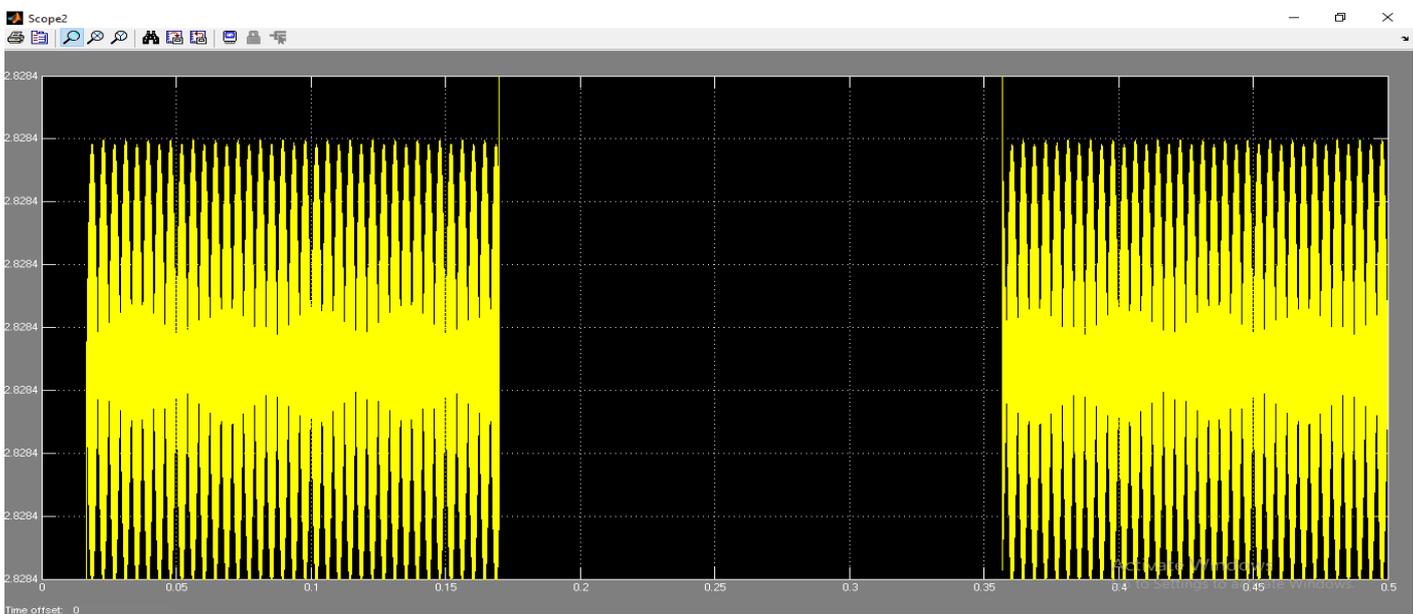
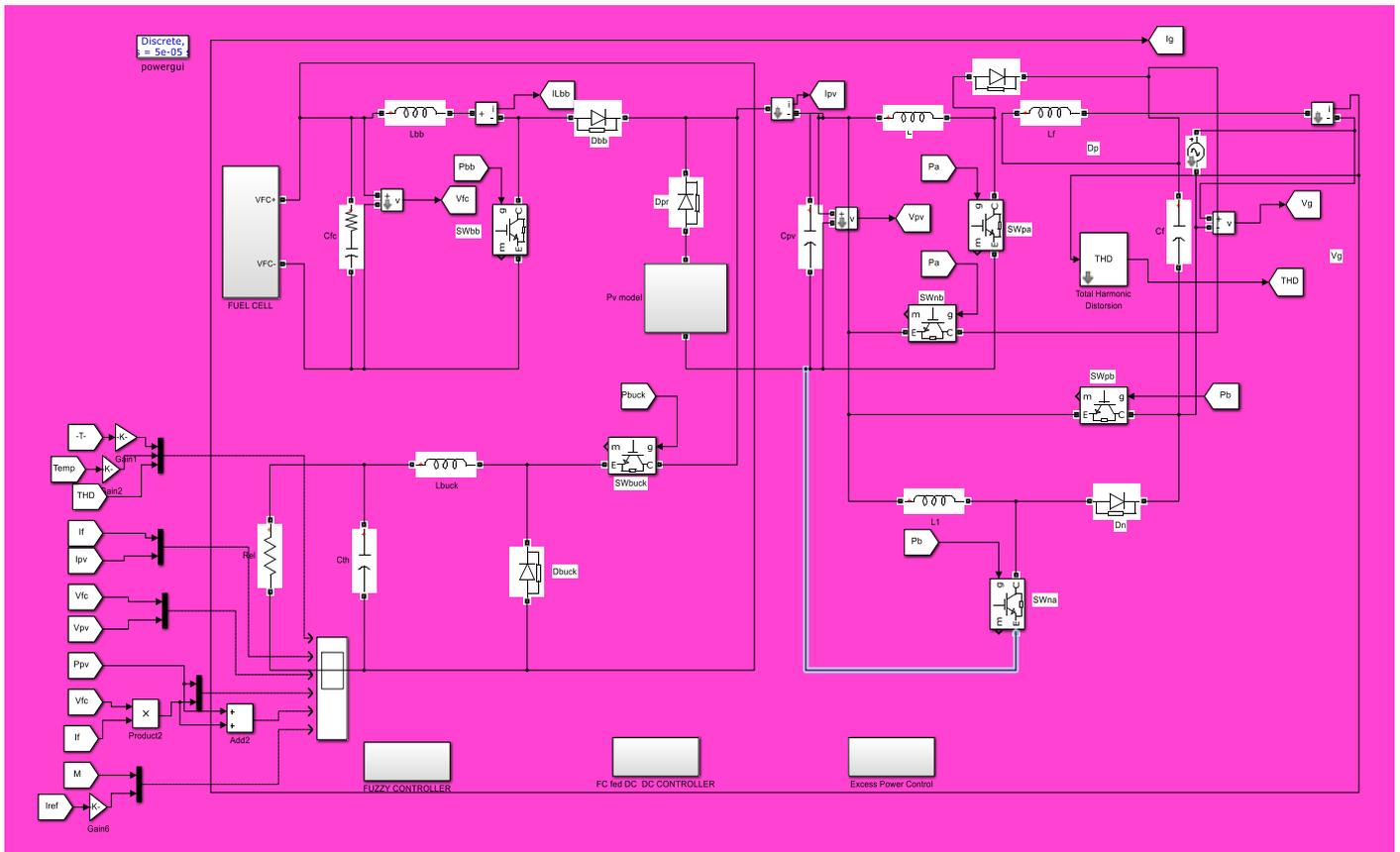
The main contribution of this project is summarized as

- 1) Design of a network based control scheme for inverter based sources, which provide proper current control during grid connected mode and voltage control during the islanding mode.
- 2) Development of algorithm for intentional islanding detection and synchronization controller required during grid re-connection.
- 3) Dynamic modeling and simulation has to be conducted to show system behavior under proposed mode during simulink.

From the simulation result using simulink dynamic models, it can be shown that these controllers provide the micro grid with a deterministic and reliable connection to the grid. For the sake of system control and protection, DG units are not usually set to participate in regulating the frequency of the grid neither the voltage during a grid connected mode. They are set to operate in a constant power mode and that is to provide fixed level of real power at high power factor (PF), while the grid frequency and voltage levels are determined by the utility control systems. 2. The governor system attached with those DG units is responsible for providing that constant level of real power, while the excitation and automatic voltage regulation system ensures the constant reactive power output through automatic voltage regulation reference 3. However, when there is a transition from the grid-connected mode to the islanding mode whether it was for intentional or unintentional reasons, these external power control systems are bypassed and new control systems take over depending on the islanding method agreed upon by the utility and the DG units' operators.

If this is not the case, then existing governor and excitation control systems remain operating at a predefined reference values chosen according to international standards for safe and stable operation whilst in the islanding mode 5. Moreover, operating part of the distribution networks in islanding mode needs to take into consideration certain limits for frequency, voltage and harmonics. These limits must be derived from international standards such as those listed in Table 1, and that ensure a safe, reliable, and standard quality supply to all end users loads existing within the island

6. Simulink Model of the system



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BIOGRAPHIES



Ruchali Borkute has completed her undergraduate B.E Degree in Electrical Engineering From RTMNU University in 2017 .Currently she is pursuing her Master degree PG IN Electrical Engineering in the branch of IPS From the RTMNU Nagpur University, Nagpur. Her Research Area of Interest Mainly lies in the Solar Photo Voltaics,Intentional Grid Islanding