[NC-Rase 18]
DOI: 10.5281/zenodo.1489860

ISSN 2348 – 8034
Impact Factor- 5.070

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

DROOP CONTROL METHOD FOR PARALLEL SOLAR INVERTER-A-REVIEW

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ABSTRACT

Basically, droop control is not actually a controller, but it is a concept in which, inverters are assumed to operate on the basis of their capacities. Droop based VSI (voltage source Inverter) are more effectively used where different Renewable Energy Source (RES) are connected in parallel. For this operation, the inverter is to be controlled for which, PI and PR controller can be used. In droop Controlled Voltage Source Inverters, It is the general trend to increase the electricity production using distributed power systems. An AC Micro-Grid system transfers the DC power from a Distributed Energy Resource (DER) unit, for example, a photovoltaic (PV) solar array, wind-power, or a fuel cell transfers power to the utility grid and it has the capacity to operate autonomously. To achieve good power sharing and wireless communication between renewable energy sources, one of the most popular approaches is to employ droop control for active and reactive power regulation. The renewable energy sources can meet the new load requirements in a manner determined by its frequency and voltage droop characteristics.

Keywords: *Photovaltaic PV, Voltage Source Inverter, Micro Grid, PI & PR Controller*

I. INTRODUCTION

Due to fast depletion of conventional fuels and the rising demand of electricity power, the interconnection of renewable energy sources (RES) including solar, hydro, wind and geothermal, and other distributed generation etc., has raised concern in the last few years. Hence, it is important to increase the electricity production using distributed power systems. An AC Micro-Grid system transfers the DC power from a Distributed Energy Resource (DER) unit, for example, a photovoltaic (PV) solar array, wind-power, or a fuel cell transfers power to the utility grid and has the capacity to operate autonomously. To achieve good power sharing and wireless communication between renewable energy sources, one of the most popular approaches is to employ droop control for active and reactive power regulation. The renewable energy sources can meet the new load requirements in a manner determined by its frequency and voltage droop characteristics. Another significant feature of micro-grid is the reauthorization for smooth reconnection to utility, which means that a micro-grid not only can disconnect from the utility when grid fault is detected, but also reconnect to the utility when the fault is cleared, and these operation mode transition should not cause negative effects on the utility and critical loads.

In order to control the renewable energy sources more effectively and fulfill power quality requirement, micro-grid concept is proposed recently. A micro-grid is a cluster of RES and loads, which can operate in both grid-connected mode and islanded mode. All the renewable energy sources are parallel connected to an ac common bus through inverters or ac-to-ac converters. The key functional element of an AC Micro-Grid system is a Voltage Source Inverter (VSI). The different Renewable Energy Sources (RES) within the Micro-Grid system can operate independently or interconnected to a common DC link which supplies constant input to the VSI. These systems are to be properly controlled in order to provide the reliable power system to the utility network.
This paper focuses on a review control strategy that is used for the operation of a parallel inverters based micro-grid.

First, the power flow in a network system is investigated, based on which the droop control method for micro-grid is presented. Furthermore, inverter control techniques are discussed and combined with the droop method for proper power sharing. Droop control is a concept which is done for active and reactive power sharing between the parallel

inverters. For droop control technique, there is a need of at least two parallel connected inverters. As the main objective is to observe power sharing between the two inverters, droop control technique is mainly used for minigrid systems where main grid in islanded. This control method is used for the regulation of the voltage and the frequency on AC minigrids, fed by voltage source inverters. In order to avoid a complex communication network for the synchronization of the various VSI on a minigrid, a conventional method called Droop Control is used.

II. LITERATURE REVIEW

- **Juan.C.Vasquez** – In this paper the control for Parallel voltage source inverter (VSI) System is analysed and developed in a stationary reference frame including current and voltage control loops the Secondary control for frequency and voltage amplitude restoration the parallel operation on inverters with different types of output impedance, the power sharing, the voltage and frequency regulation, as well as the current limiting**, i**n this system synchronization algorithm is necessary**,** also it is using PR Resonant turn for the frequency. [4]
- **Jernomino Quesada,Rafael Sebastian –**This paper first analyzer the non decoupled behavior of classic droop control method the classic droop control based active and reactive power measurement also the droop control method for Inverter participating in low voltage microgrid and its application as primary control layear can be actuated from secondary control layer dispatch active and Reactive Power. the active power shared equally because various types of inverter imbalance in reactive.[5]
- **M.A.Roslan ,Syafraddin Hasan –** In This paper high reliability and quality nessitaites the use of multiple distributed energy resource to be connected in parallel ,the droop control techniques for the parallel inverter system using this conventional Droop control is deduced from impedance and the Microgrid droop control this technique is able to achieve good transient performance [1]
- **Masoud Alikbar golkar –** In this paper droop control microgrid and droop is the solution for sharing the demand power between generator in Autonomous microgrid ,active and reactive power is considered in the microgrid The equal sharing of linear and nonlinear loads were intensively investigated and high Accuracy of equal sharing can be achieved.the conventional droop technique followed by the modified droop technique.This technique tries to mimic the parallel operation of a large scale power system that droops the frequency of the ac generator when its output power increases. By using an inverter, the frequency and amplitude of the output voltage can be controlled independently [3]
- **K.De .Brabanere ,B.Bolsens** – In this paper a new method for parallel operation of one or several inverter, the small droop control is generally considered acceptable as long as error remains within the limit there are different method are use for voltage and frequency droop control through active and reactive power and droop control through active and reactive current, imitating a voltage source with a complex finite-output impedance, voltage droop control is obtained. Frequency droop control results from synchronizing [2]
- **Reshma Mary Thomas** – In this paper give the analysis on current sharing issue of Parallel DC converter in photovoltaic (PV) System Solar Wind power generation system with maximum power point tracing (MPPT) Technique incremental conductance Method is used for the simulation Analysis. Incremental conductance method of MPPT is used to track maximum output The parallel DC- DC boost converter with sliding mode control technique is used.[6]
- **Amit S. Borole, Kamlesh K. Chauhan-** The paper consists of three phase Voltage Source Inverter control scheme which is called as Proportional controller. the main attempt is made of droop controlling of three phase parallel connected inverters. For this, PI controller is used to synchronize load and the system. Droop control technique is the active and reactive power sharing between the parallel inverters according to the demand of load.

III. ACKNOWLEDGMENT

We are grateful to ‘’Mauali Group Institutions collage Engineering And Technology’’ and faculties from Electrical Engineering department for their constant support, for publishing this work.

ISSN 2348 – 8034
Impact Factor- 5.070

IV. RESEARCH OBJECTIVE

Due to a broad view of generation of renewable energy sources, its important to use it significantly by appropriate use of power in active and reactive form. The main objective of research is to control active and reactive power flowing from separate inverters to the load prior to the load variations.

Hence, droop control technique, allows inverters to share the power according to their individual capacities. This helps micro grid to work efficiently ,The main objective of this work is to put forth the control of parallel connected inverters on droop coefficients basis.

V. FUTURE SCOPE

As per above discussion in literature review, the transient response of the Droop controlled system is poor which can be improved by employing good controller. During the sudden changes in load, the time taken by inverters to satisfy adequate load demand is more. This time can be minimized.

VI. CONCLUSION

In this paper different method use for the droop control droop control.These methods are using voltage source Inverter to control voltage ,current and frequency also this method is use for the low voltage control using in solor parallel inverter.It uses one or several inverter using in this voltage and current ,frequency droop control to active and reactive power flowing through the inverter. Thus we reviewed the control of pararallel connected inverter.The droop control uses the real power out the generator to calculate the ideal frequency.

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