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POWER FLOW CONTROL BY USING HYBRID POWER GENERATION

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ABSTRACT

This paper proposes that coordinated control strategy for ac islanded microgrids. In order to control flexibly the each of power unit. A coordinated operation of microgrids requires that energy management system takes into account both the available power in renewable energy sources(RES) and storage capacity of energy storage systems(ESS) The main objective of Hybrid micro grids have been planned for the better interconnection of different distributed generation systems (DG) to the power grid, and exploiting the prominent features of both ac and dc micro grids to Attain, Proper power management and control strategy. In this project is to maximize voltage as well as to improve efficiency. Additionally, in order to achieve flexible power of each unit by using ESS\RES unit can be obtained with seamless mode changes. Furthermore, decentralized power management can be achieved by executing frequency bus signaling. The power management principle based on different operational modes is explained in detail and small-signal analysis is carried out for SSDC and power control mode.

INTRODUCTION

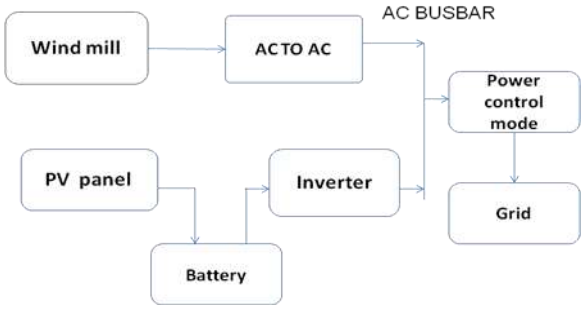
Due to the critical condition of industrial fuels which include oil, gas and others, the development of renewable energy sources is continuously improving. This is the reason why renewable energy sources have become more important these days. Day by day, the demand for electricity is rapidly increasing. But the available base load plants are not able to supply electricity as per demand. So these energy sources can be used to bridge the gap between supply and demand during peak loads. This kind of small scale stand-alone power generating systems can also be used in remote areas where conventional power generation is impractical.A wind-photovoltaic hybrid power generation system model is studied and simulated. A hybrid system is more advantageous as individual power generation system is not completely reliable. When any

one of the system is shutdown the other can supply power. A block diagram of entire hybrid system is shown below.

LITERATURE REVIEW:

Due to high demand of energy and limited availability of conventional energy, non-conventional sources become more popular among researchers. A lot of research work is going on to enhance the power efficiency of non-conventional sources and make it more reliable and beneficial. Hybrid generation system uses more than one source, so that we can extract energy from different sources at the same time which enhances the efficiency. The working of PV /Wind hybrid system is understood, different topologies that can be used for the hybridization of more than one system and also about advantages and disadvantages of hybrid system. Basic details of PV cell, PV module, PV array and their modeling are studied. Also, the behavior of PV modules at varying environmental conditions like solar irradiation and temperature are studied. Behavior of PV module during partial shading condition and also how it's bad effects can be minimized is explained. Different MPPT techniques, their advantages and disadvantages and why MPPT control is required is explained. The wind energy system, its working and also techniques to extracts the maximum power from the wind energy system is understood. Study about different type of bi-directional converters, their working and how to use them in battery charging and discharging is carried out.

Block diagram:

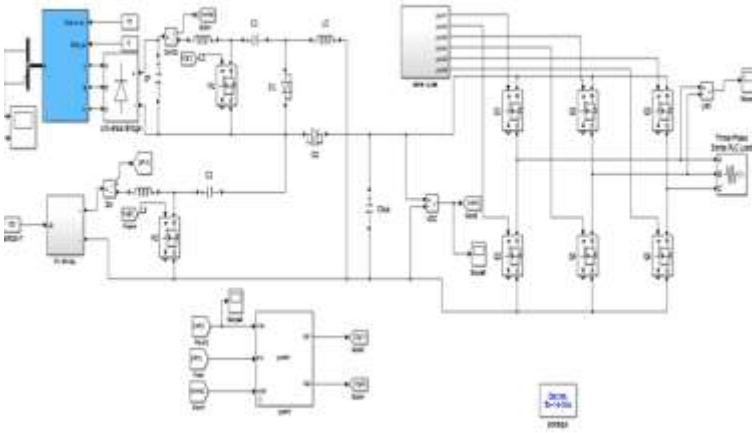


The entire hybrid system comprises of PV and the wind systems. The PV system is powered by the solar energy which is abundantly available in nature. PV modules, maximum power point tracing systems make the PV energy system. The light incident on the PV cells is converted into electrical energy by solar energy harvesting means. The maximum power point tracking system with Perturb & absorb algorithm is used, which extracts the maximum possible power from the PV modules. The ac-ac converter is used to converter fixed ac voltage to variable ac. Wind turbine, gear box, generator and an AC – AC converter are included in the wind energy system. The wind turbine is used to convert wind energy to rotational mechanical energy and this mechanical energy available at the turbine shaft is converted to electrical energy using a generator. To coerce the maximum power from wind system we used a maximum power point tracing system. Both the energy systems are used to charge a battery using bi-directional converter. Bidirectional converter and the battery form the common additional load to the wind and PV energy

systems. Hybrid generation systems that use more than a single power source can greatly enhance the certainty of load demands all the time. Even higher generating capacities can be achieved by hybrid system. In stand-alone system we can able to provide fluctuation free output to the load irrespective of weathers condition. To get the energy output of the PV system converted to storage energy, and constant power delivered by the wind turbine, an efficient energy storage mechanism is required, which can be realized by the battery bank.

Modelling and Simulation

Matlab has several auxiliary Toolboxes distributed by MathWorks, Inc. which are useful in constructing models and simulating dynamical systems. These include the System Identification Toolbox, the Optimization Toolbox, and the Control System Toolbox. These toolboxes are collections of m-files that have been developed for specialized applications. There is also a specialized application, Simulink, which is useful in modular construction and real time simulation of dynamical systems.



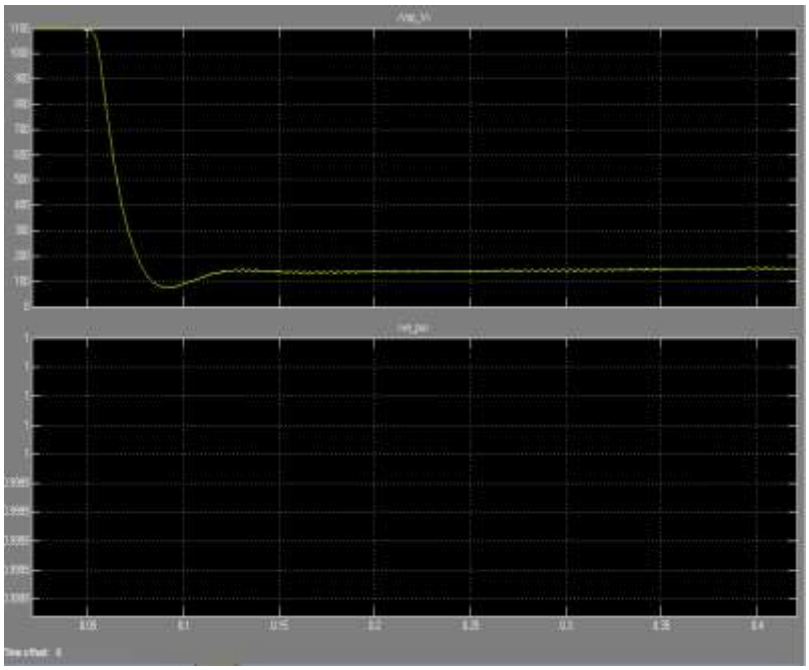
This section describes the procedure used for simulating the I–V and P–V charac-teristics of a partially shaded PV array. It is important to understand how the shading pattern and the PV array structure are defined in MATLAB using the proposed scheme. The PV array is configured as a combination of six series of PV modules connected in three parallel connections. Each set of PV modules operate under different solar radiations and different cell temperatures. The first set is under solar radiation of 800 W/m^2 and cell temperature of 750 –C, second set is under solar radiation of 600 W/m^2 and cell temperature of 250 –C, and third set is under solar radiation of 700 W/m^2 and cell temperature of 500 –C. Based on these conditions the simulations illustrating the PV characteristics is with three different multiple peaks. The maximum peak is called as global peak and the remaining two peaks are called as the local peaks.

Batteries in PV Systems:

Selecting the suitable battery for a PV application depends on many factors. Specific decisions on battery selection depend on physical properties, while other decisions will be much more difficult and may involve making tradeoffs between desirable and undesirable battery features. With the proper application of this knowledge, designers should be able to differentiate among battery types and gain some application experience with batteries they are familiar with. Consider-ations in battery subsystem design include the number of batteries is series and parallel, over-current and disconnect requirements, and selection.

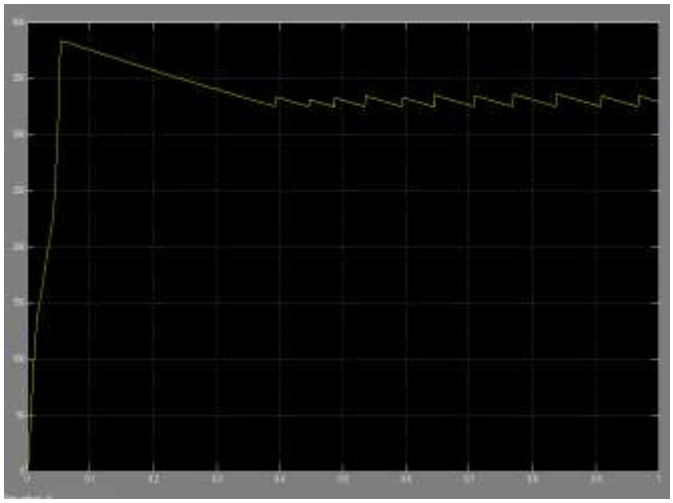
WIND TURBINE

Generally a wind turbine consists of a set of rotor blades rotating around a hub, a gearbox-generator set placed inside the nacelle. The basic components of a wind turbine system are shown in figure below.



MAXIMUM POWER POINT TRACKING

Maximum power point tracing (MPPT) system is an electronic control system that can be able to coerce the maximum power from a PV system. It does not involve a single mechanical component that results in the movement of the modules changing their direction and make them face straight towards the sun. MPPT control system is a completely electronic system which can deliver maximum allowable power by varying the operating point of the modules electrically



CONCLUSION:

The proposed novel coordinated control strategy for ac islanded microgrids. Hybrid generation system uses more than one source, so that we can extract energy from different sources at the same time which enhances the efficiency. The working of PV /Wind hybrid system is understood. In order to control flexibly the power of each unit,power control was implemented for each ESS and RES unit which adjusted droop slopes to switch modes between VCM and PCM.Based on operational modes and decentralized modes of transition of system can be obtained.which combines the power control and bus signaling methods by achieving automatic power sharing among VCM units and flexible power control of DG units.thus efficiency of the voltage improvement will be validated through simulation using MATLAB/SIMULINK.

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