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The Power Quality Enhancement Use of Different Renewable Energy Review Sources Review

[1] Alka Rani, [2] Sitaram Pal

Department of Electrical and Electronics Engineering, Rabindranath Tagore University, Bhopal

ABSTRACT

Eco-friendly technologies regarding electricity production are urgent need of sustainable energy development. Grid-tied photovoltaic systems are power-generating systems that are connected with grids in this study are designing of a grid integrated solar wind hybrid energy system for driving loads for improving its reliability and efficiency. Designing an inverter control that attains lower distortion level in the voltage as well as current waveforms. The controller should reduce the spikes at the transient loading point when the system is subjected to sudden load changes. And the system is to be integrated with the fuel system also to obtain the energy efficiency. The fuel system would be connected in parallel to the DC voltage output of the solar/wind hybrid system. Improvement in the reactive power output from the system by the inverter control by designed hybrid system that can compensate the reactive power requirement when required. This project should attain the hybrid solar/wind/fuel system with proposed controller to improve the output parameters.

Keywords: Grid system, Solar System, hybrid system, DC, PV. Microgrid's

1. INTRODUCTION

Wind turbine can be defined as a fan consisting of 2 or 3 blades that rotate due to blowing wind such that the axis of rotation must be aligned with the direction of blowing wind. A gear box is used for converting energy from one device to another device using mechanical method; hence it is termed as a high-precision mechanical system. There are different types of wind turbines, but the frequently used wind turbines are horizontal axis turbines and vertical axis turbines. Solar Power system consists of three major blocks namely solar panels, solar photovoltaic cells, and batteries for storing energy. The electrical energy (DC power) generated using solar panels can be stored in batteries or can be used for supplying DC loads or can be used for inverter to feed AC loads. Solar Energy is available only during the day time whereas wind energy is available through out the day depending upon the atmospheric conditions.

Wind and solar energy are complementary to each other, which makes the system to generate electricity almost throughout the year. The main components of the Wind Solar Hybrid System are wind aero generator and tower, solar photovoltaic panels, batteries, cables, charge controller and inverter. The Wind - Solar Hybrid System generates electricity that can be used for charging batteries and with the use of inverter we can run AC appliances. Wind aero-generator is installed on a tower having a minimum height of 18 mtrs. from the ground level. Because of the height, the aero-generator gets wind at higher speed and thereby generates more power

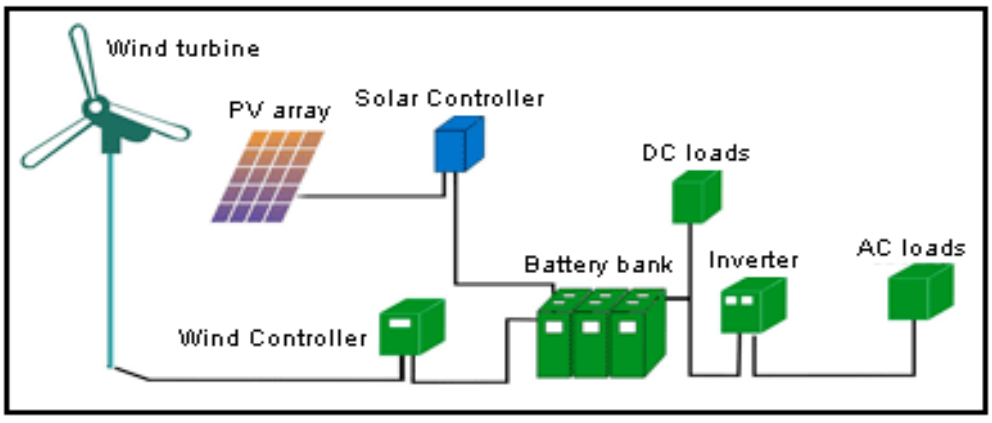
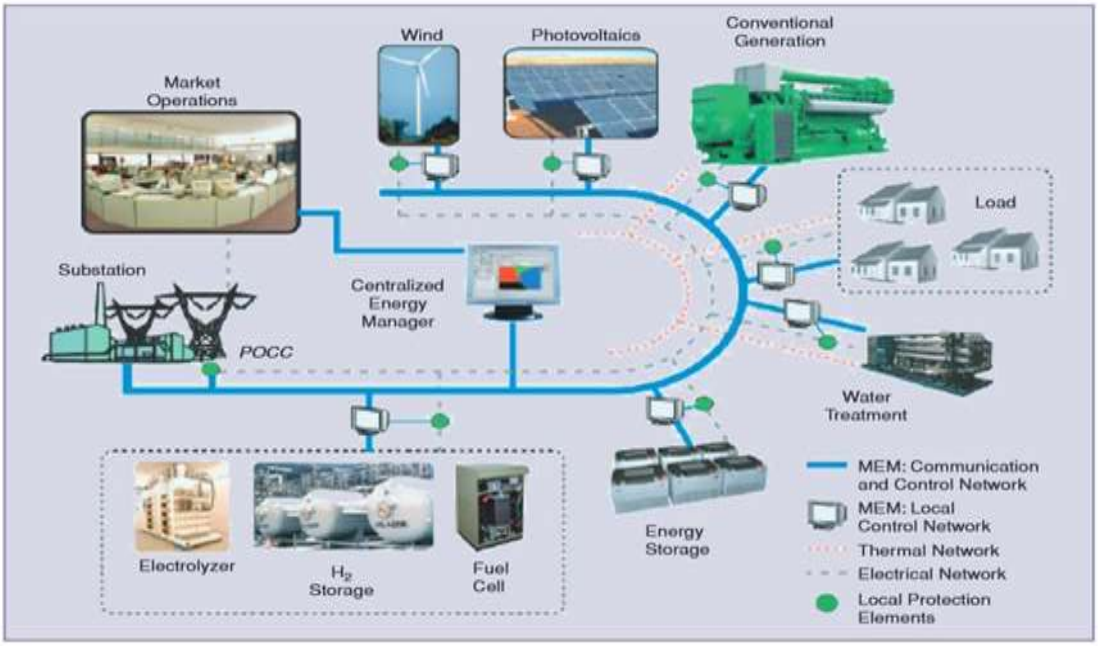


Figure 1 A small size solar-wind hybrid power system

1.1The Concept of Micro-grids

The electricity grid connects power plants, transmission lines, or allotment lines to provide power to users. In power plants, electricity comes from renewable or non-renewable energy sources. The current is then transmitted from one place to another through the transmission line. Finally, the power is distributed among the users using distribution feeders. A micro-grid is defined as a "local grid that connects distributed energy sources with organized loads and is usually connected to the traditional central grid synchronously" Micro grid sources are called micro-sources: battery storage, solid oxide fuel cells, wind energy, solar energy, diesel generators, etc. Each source is proscribed in its way to connect it to the distribution network.



2.Motivation

The former is becoming an unbearable burden on the transmission network, while the latter, together with the awareness of the harmful acts of fossil fuels burning both on humans and environment, has brought to the spreading of renewable energy sources. Investigating the effects of the aforementioned consequences, the growth of in-stalled RES introduces new problems in the grid due to the stochastic behavior of their prime mover e.g. sun and wind . Indeed, it is more difficult to deliver constant power following the loads demand when the power production is not constant. For this reason and due to the increase of efficiency and reliability and the decrease of cost of power electronics, converters have been largely deployed

3.MPPT Algorithm

Maximum power point tracking (MPPT) is an algorithm applied to photovoltaic (PV) to continuously adjust the impedance detected by the photovoltaic system to keep the photovoltaic system close to the photovoltaic system under changing conditions—sunlight, temperature, and load. Engineers creating solar inverters use the MPPT algorithm to increase the power generated by photovoltaic systems.

The algorithm monitors the power to ensure that the system operates at the "maximum power point" (or maximum load) on the power processing line, as shown below. The MPPT algorithm is often used in the design of controllers of photovoltaic systems. The algorithm considers variable radiation (sunlight) and temperature to ensure that the photovoltaic system produces the maximum amount of electricity.

Maximum voltage control is commonly used in wind turbines and photovoltaic (PV) systems to increase power output in all situations. Although this concept covers solar energy, the concept applies to frequently changing light sources: optical power transmissions and thermal solar cells. As for the connection between the photovoltaic system and the inverter system, the external network, the battery pack, or other loads.

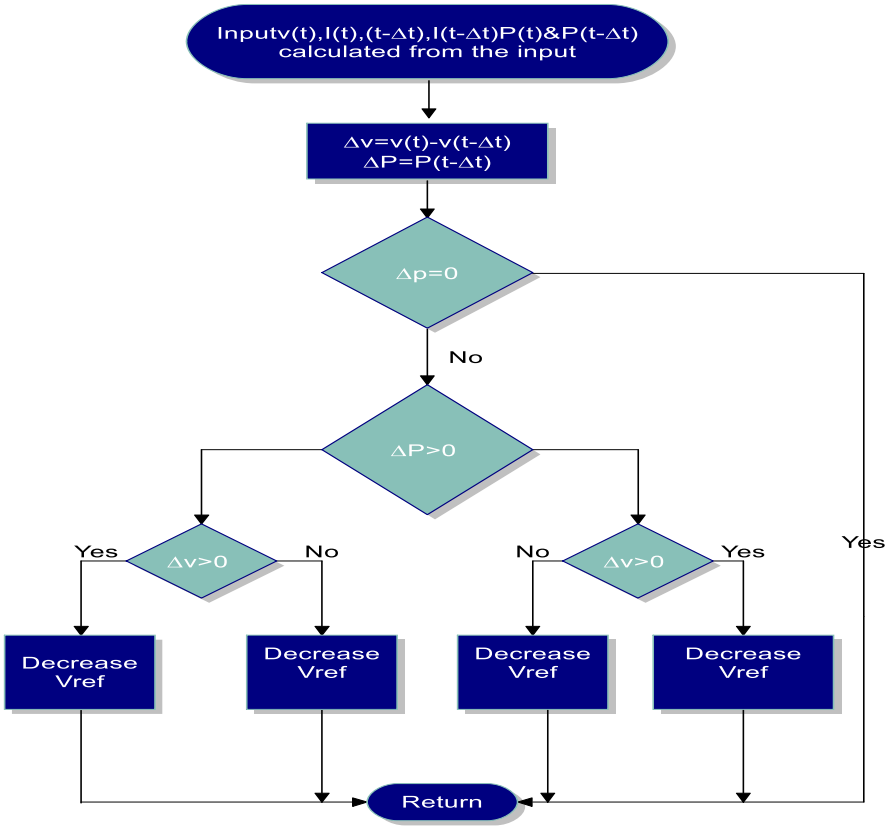


Figure 2. The Flowchart of the P&O Algorithm

Perturb and Observe method is a most commonly used method for solar and wind energy conversion system. In case of solar PV system the PV output voltage and current are measured two consecutive intervals. The power is calculated for two successive intervals.

Algorithmic steps:

Step 1: Measure the two consecutive values of voltages and currents of solace PV.

Step 2: Calculate the powers P(n) and P(n-1).

Step 3: If the powers are increasing, then decrease the duty cycle.

Step 4: If the powers are decreasing, then increase the duty cycle.

Step 5: Go to step 1.

4.METHODOLOGY

This paper proposes intelligent energy-saving system architecture for microgrid control and management. In the MAS-based intermittent microgrid network for renewable energy optimization, the agent-based reproduction method is used to model microgrid. The interaction between different intellectual decision-makers is examined through reproduction—the whole system. A smart grid is a system where the energy system requires a decentralized control structure. Still, it cannot quickly transform from a central control structure to a decentralized control structure. In this proposal, some new partial control architectures are designed for different types of renewable resources.

5. Simulation Result

The output powers of DGs are changed from initial values to new values as agents require getting more power from all DGs . DG1 = 400kW, DG2 = 1110kW and DG3 = 120kW).in fig 4.10 showing DG 1,DG2,DG3 power output. DG set (a unit of diesel engine and governor) is a unit that exchanges the energy of a fuel (diesel) into the diesel engine's mechanical energy or converts the emotionless energy into the governor's electrical power.

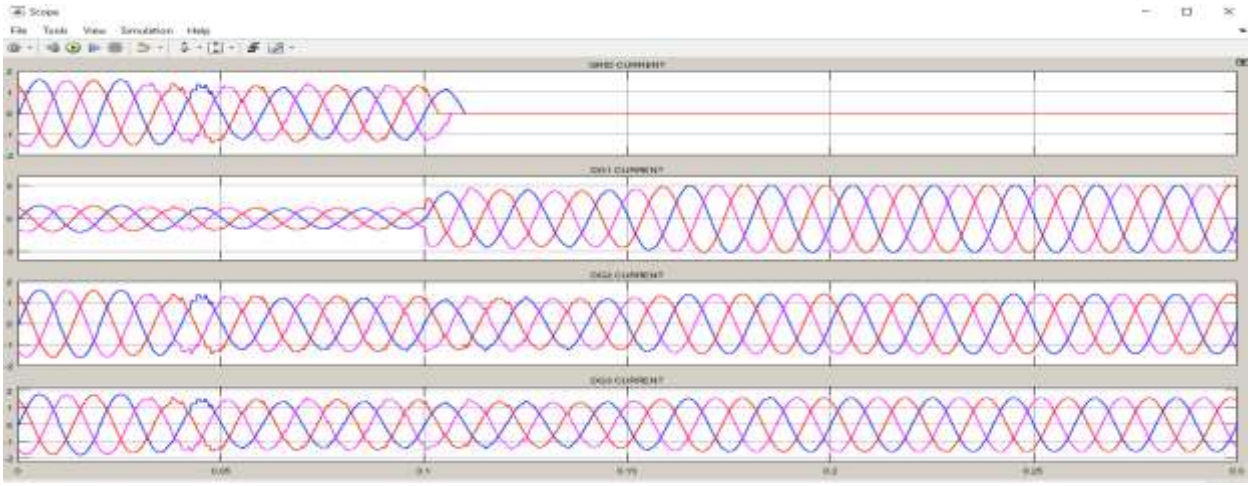


Figure.3 Grid Current, DG1, DG2, DG3 output current

Shows the control actions performed in the system. It can be observed that stability of the microgrid is not lost due to primary control action of the sources.

Figure.4. MPPT Control Output

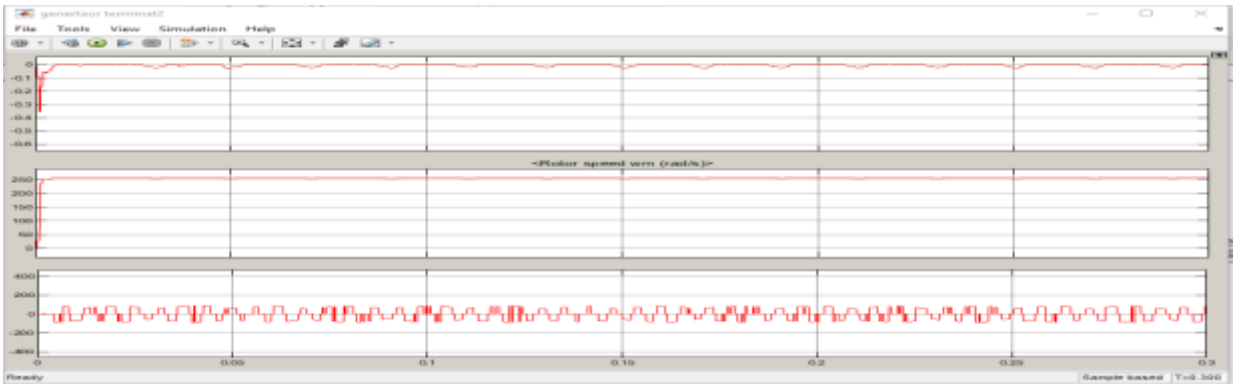


Figure 5. Solar Output

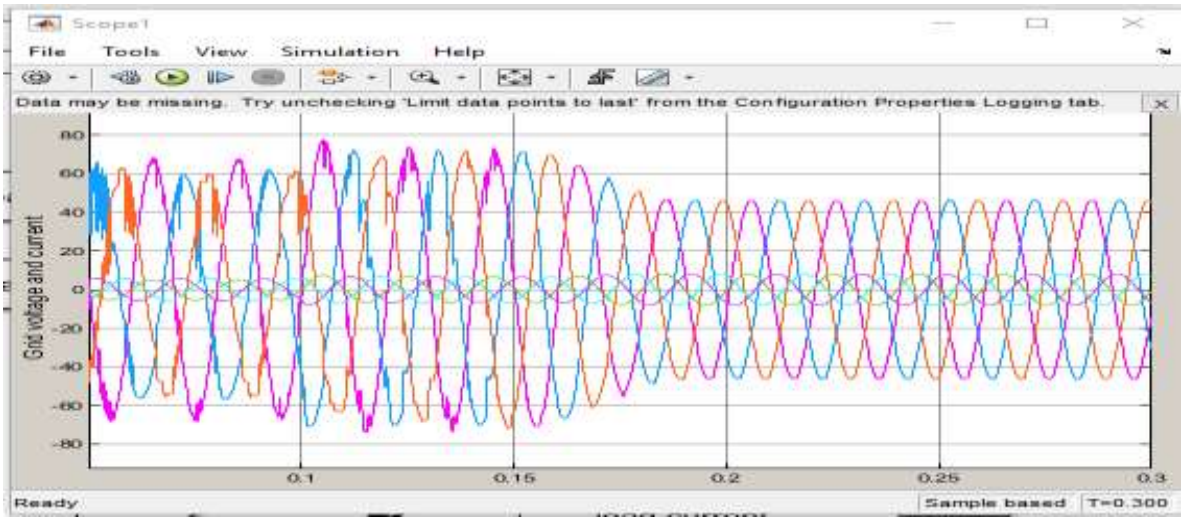


Figure 6. Grid voltage and current

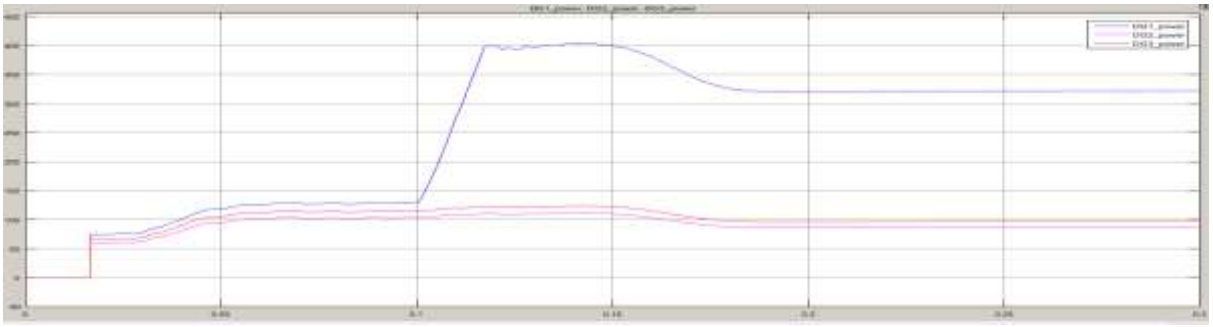


Figure 7. MPPT Control Output

6. Conclusions

The simulation results show that the combination of pitch angle controller, generator-side inverter controller, and grid-side inverter controller has good dynamic and static performance. The maximum power can be tracked, and the generator wind turbine can be operated with high efficiency. DC-link voltage is kept at a stable level for decoupling control of active and reactive power. Hence, the output will get the optimum power supply for the grid. the solar design consists of photovoltaic (PV) panels, wind turbines based on permanent synchronous generators, and batteries as energy storage systems. MPPT uses augmented conductivity technology applied to photovoltaic and wind energy systems. The PV array after MPPT is connected to a DC-DC converter amplifier and connected to a conventional bus network.

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