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DPLL- Based Control of a Hybrid Wind-Solar Grid Connected Inverter in the Distribution System

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ABSTRACT: This paper introduces an intelligent extraction of optimum power and its dispatch by using PI logic from a grid tied hybrid generation system comprising of a permanent magnet synchronous generator based wind turbine and a low concentration photovoltaic generator. For photovoltaic generator, maximum power point tracking control is implemented using PI logic under varying solar irradiance. Power extracted from wind turbine is designed as a PI function of the dc link voltage error, its rate of change and error in the direct axis current of the inverter. This reduces high frequency oscillations in the wind extracted power. Such an extraction is considered as a novelty of this paper. A failure mode and effect analysis is done for power converters and possible mitigation schemes are suggested for different faults. A 1:1 delta wye-grounded transformer is used at the inverter output to eliminate the triplet harmonics. Further, dynamic performances of both PI proportional-derivative and integral (PD+I) controller and classical proportional integral (PI) controller, to control the inverter currents, are compared. The proposed method results in an enhanced power dispatch and improvement in distortions and oscillations in the converter currents. This also reduces the probability of failures in the converter switches and other passive components.

I. INTRODUCTION

Hybrid energy system is the combination of two energy sources for giving power to the load. In other word it can be defined as “Energy system which is fabricated or designed to extract power by using two energy sources is called as the hybrid energy system.” Hybrid energy system has good reliability, efficiency, less emission, and lower cost. In this proposed system solar and wind power is used for generating power. Solar and wind has good advantages than other than any other non-conventional energy sources. Both the energy sources have greater availability in all areas. It needs lower cost. There is no need to find special location to install this system.

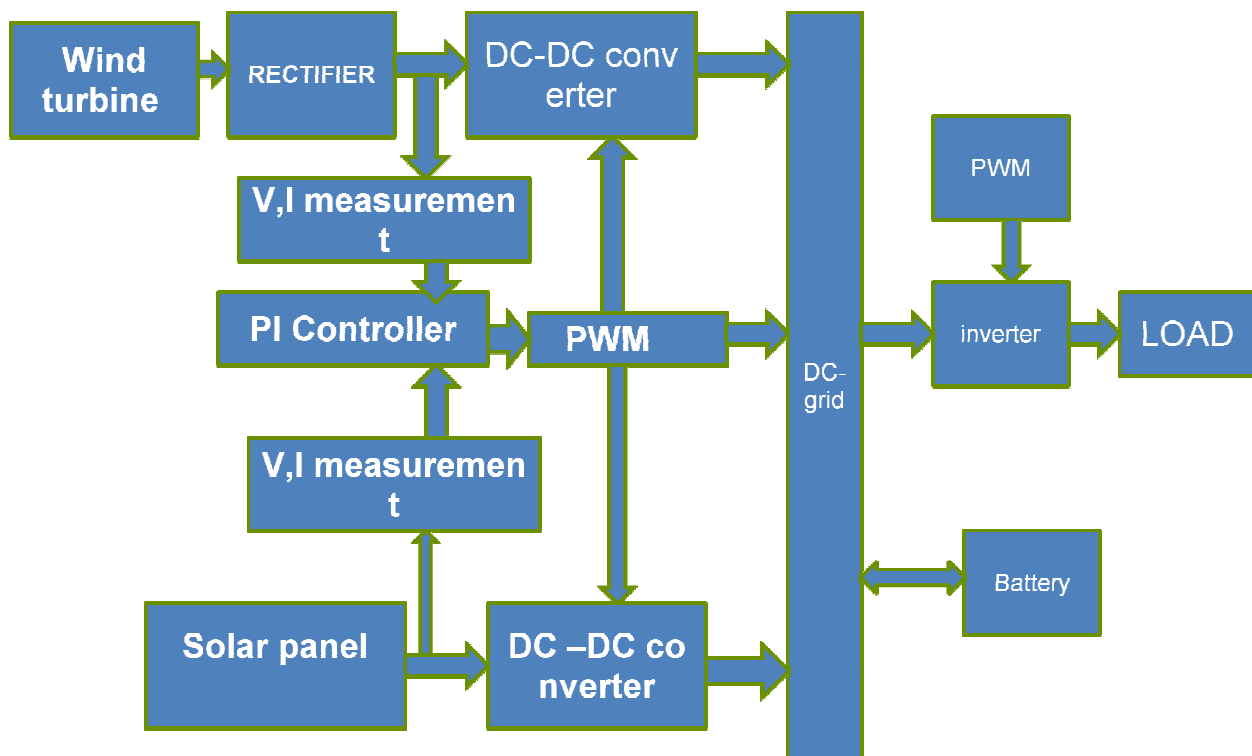
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II. BLOCK DIAGRAM



We implemented VSI so harmonics create in system is low
 Due to VSI harmonics compensation Harmonic will less then 2% in proposed system
 Implementation of PI controller will reduce the response time for DC grid voltage stabilization
 Microcontroller – ATMEGA8

- High-performance, Low-power AVR® 8-bit Microcontroller
- Advanced RISC Architecture
- High Endurance Non-volatile Memory segments
- Peripheral Features
- Special Microcontroller Features
- I/O and Packages
- Operating Voltages
- – 2.7 - 5.5V (ATmega8L)
- Speed Grades
- – 0 - 8 MHz (ATmega8L)
- – 0 - 16 MHz (ATmega8)
- Power Consumption at 4 MHz, 3V, 25°C

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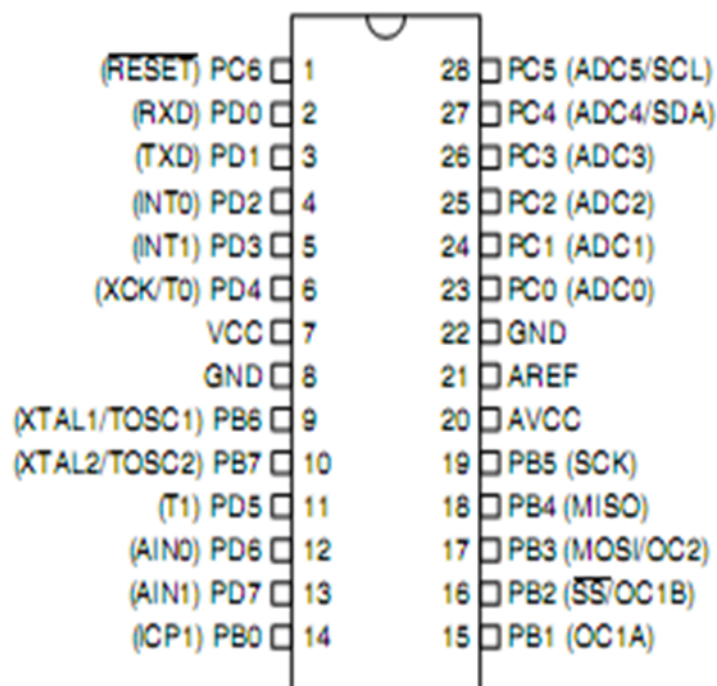
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III. PIN CONFIGURATION

PDIP



COMPONENTS:

- Solar panel
- Wind mill
- ATMEGA(8)L IC
- Rectifier
- Inverter
- Multi meter
- DC-DC converter
- Power supply
- Transformer
- Voltage rectifier
- Otto coupler
- Filter circuit
- 1phase IM

ADVANTAGES:

- output wave form
- Harmonic compensation
- Low THD
- Reduce conversion losses

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- Less cost improved

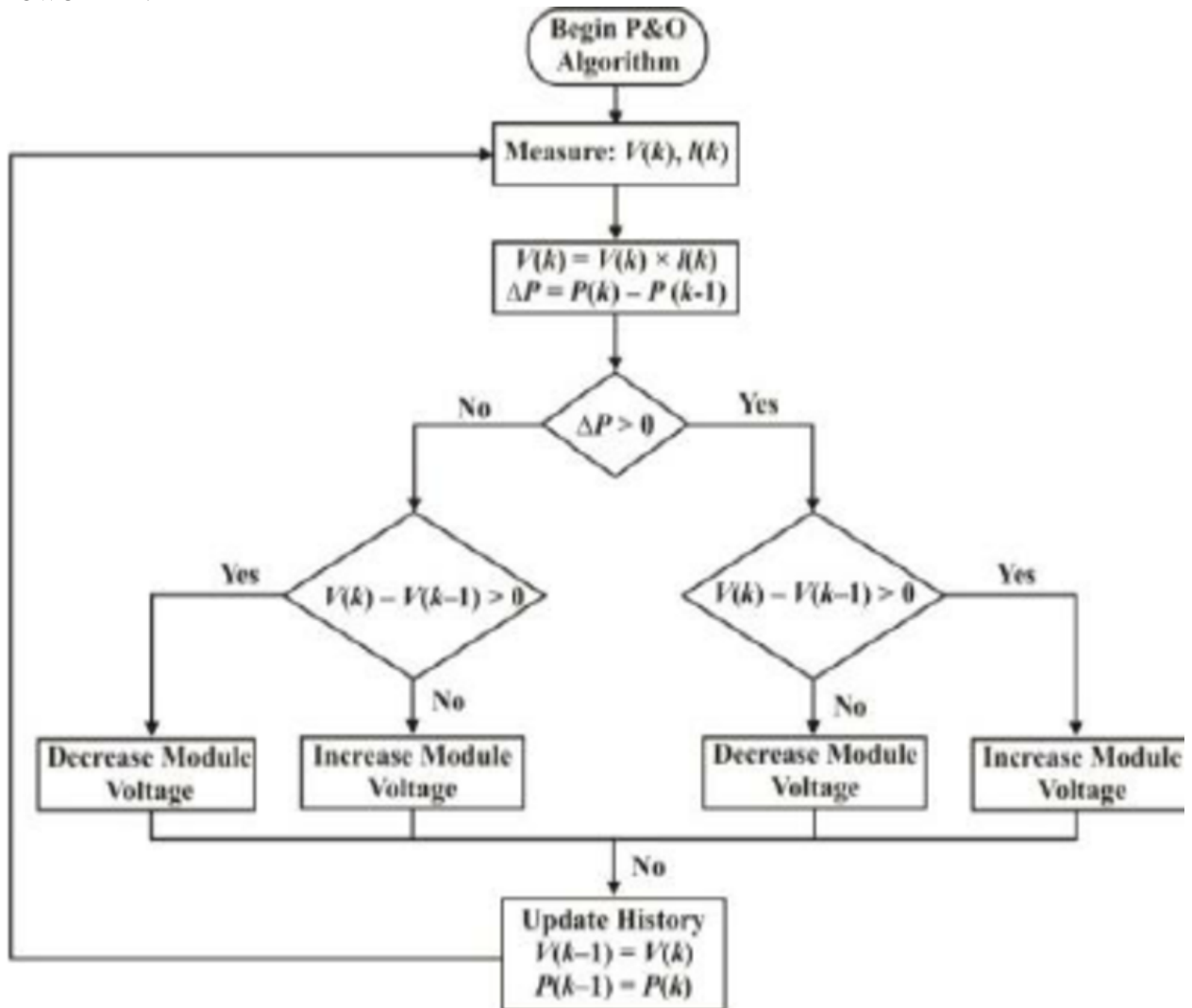
DISADVANTAGES:

- For this system cant eliminates 3rd and 9th harmonics in active power filters
- DC grid voltage ripples high

APPLICATIONS:

- Transmission lines
- Renewable energy system

FLOWCHART:



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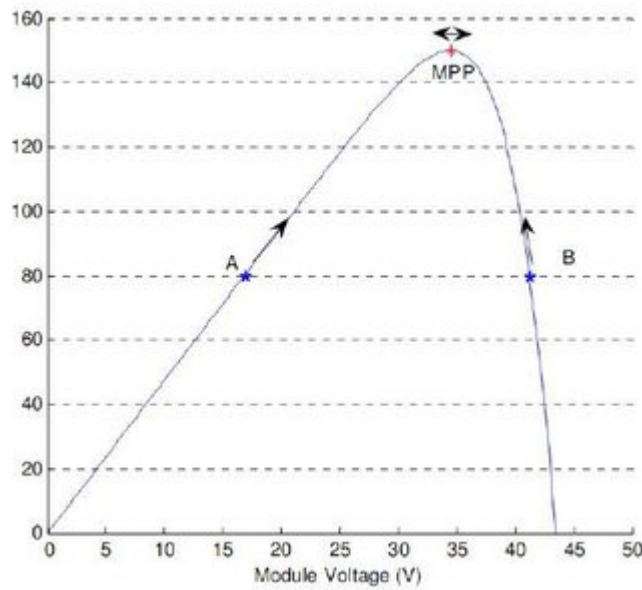
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IV. RESULT

Solar panel characteristics showing MPP and operating under point A and B:



OUTPUT:

A Simulation Results

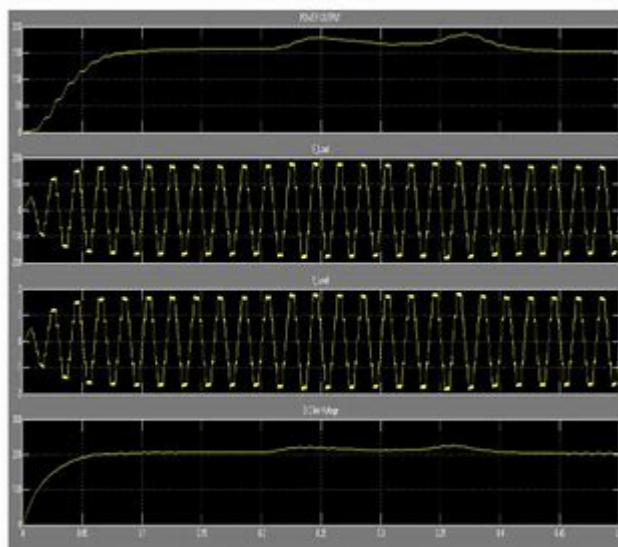


Fig-7 Simulation output waveform of hybrid wind PV system.

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INVERTER:



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HYBRID WIND-SOLAR:



V. CONCLUSION

Hybrid power generation system is good and effective solution for power generation than conventional energy resources. It has greater efficiency. It can provide to remote places where government is unable to reach. So that the power can be utilize where it generated so that it will reduce the transmission losses and cost. Cost reduction can be done by increasing the production of the equipment. People should motivate to use the non conventional energy resources. It is highly safe for the environment as it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It only need initial investment. It has also long life span. Overall it good, reliable and affordable solution for electricity generation

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