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OPTIMAL POWER GENERATION OF WIND MILL BY USING FUZZY LOGIC CONTROLLER AND SVPWM TECHNIQUE

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ABSTRACT

Nowadays, Renewable Energies have been widely applied to achieve eco friendly objectives. This paper presents the development of a single-phase grid-connected wind energy conversion system(WECS), Digital Signal controller (DSC) In proposal method harmonics present in PLL Single-phase grid-connected wind energy conversion system (WECS) that uses a modified PLL method PLL gets input from the load side only compare with any one parameters current or voltage (closed loop system)The modified single-phase fuzzy logic based on the PQ theory integrator is proposed instead of a conventional lag structure. The voltage source inverter (VSI) is driven by a Space Vector Pulse Width Modulation (SVPWM) where a lag structure based on an integrator is proposed instead of a conventional lag structure using a Maximum Power Point Tracking (MPPT) algorithm based on the steepest ascent method The aim of this project is to propose a new topology in HILL CLIMB method The tasks related to the SVPWM algorithm we using Digital signal controller, inverter, maximum power point tracking, space vector modulation, we get output more than 10% compare to existing method& we get output in Space Vector Pulse Width Modulation (SVPWM)

*Index Terms: I*nverter, space vector modulation, Fuzzy Logic Controller with Rule viewer, SVPWM Generator, PLL, Maximum power tracking, wind power generation.

I. INTRODUCTION

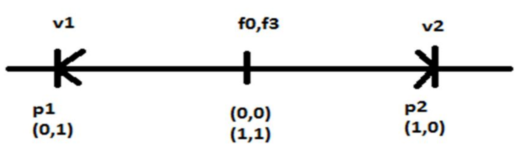
In past years there has been mainly focused on renewable energy sources such a photovoltaic and wind energy conversion system (WECS) (Wind Energy Conversion System) [1]. Compare the fossil fuel methods, better obtain the energy in WECS.[2,3] In WECS is important to have an emulator for small WECS(Wind Energy Conversion System) to allow the design analysis and Testing for Electrical components[4,5,6],for this only use of DC motor chosen to drive and wind turbine recycle by changing the armature (or) Field currents of the DC motor[7] A Important trends on wind generation systems based on (PMSG) Permanent synchronous generator [8] high power Three phase inverters[8-10] this not match for small applications power generations In home applications are only connected at small power generations [WECS] (Wind Energy Conversion System) operates at constants and variable speeds[11], converters are connected series connections a voltage of variable frequency and amplitude in grid was uncoupled with generator not necessary for mechanical gearbox[12,13] using doubly fed induction generators' deal with all generating power in WECS [14,15] phase locked loop (PLL) achieved in synchronization to electrical power grid. So, many problems occurs in grid (eg : Swells, notches, sags, harmonics [16,17] produced in single phase quadrature [18]. In this paper used hill claim method modified at main different to exiting method.

To control the synthesized voltage signal and amplitude we can control the grid power flow use the low reactance components to reactive power delivered minimized with impedance coupling in phase voltage is zero condition, so power factor will be close to one[19,20] in small power WECS (Wind Energy Conversion System) are use pitch angle is adjusting the blade and controlled in mechanically [20] maximum power point tacking system (MPPT) are used to compare the output of the universal bridge and output of the system with smoothing filter and we get output to fuzzy logic controller to generating angle pulse to provide the output of the angle to trigger the inverter switching to particular angle difference to upper and downer switching devices

DCS (digital signal control) this mainly used for the TDH reduction. That is given signal to reduce the total harmonics reduction and we get output of the SVPWM output including. The space vector modulation (SVPWM) Algorithms using DSC and PLL.

II. SINGLE PHASE SVPWM

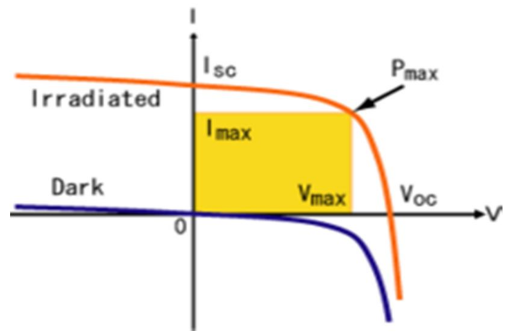
In the past system to reduce the harmonic distortion in single phase system but this method remove the most unwanted harmonics up to 0.5% in get SVPWM outputs so many different ideas of triggering pulse of inverters [22] switching methods is possible to group switching. And inverter switching using one dimensional space vector arrangements space vector of single phase full bridge inverter two terminals are present in same potential (Vcc and Gnd.)



V1 and v2 are two operating regions representing by state vectors'1' is represents by conduction of the upper switching and same as '0' is represents by the lower angle switching devices, switching operation was alternatively up and down switching ,mention the command vector is (V) the output of the inverter at desire output frequency to produce the inverter, at alternatively switching frequency.

III. MAXIMUM POWER POINT TRACKING

Current - voltage characteristics of a solar cell at a particular light level, and in darkness. The area of the yellow rectangle gives the output power. Pmax. denotes the maximum power point Maximum power point tracking (MPPT) is a technique that grid tie inverters, solar battery chargers and similar devices use to get the maximum possible power from the PV array.[1] Solar cells have a complex relationship between solar irradiation, temperature and total resistance that produces a non-linear output efficiency known as the *I-V curve*. It is the purpose of the MPPT system to sample the output of the cells and apply a resistance load to obtain maximum power for any given environmental conditions.[2] Essentially, this defines the current that the inverter should draw from the PV



in order to get the maximum possible power (since power equals voltage times current)

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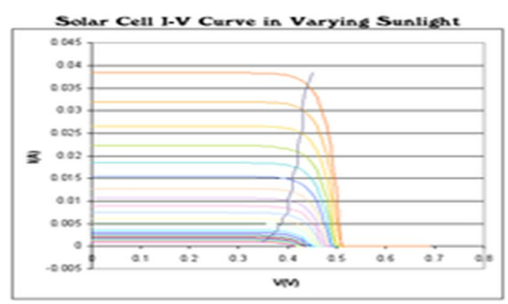
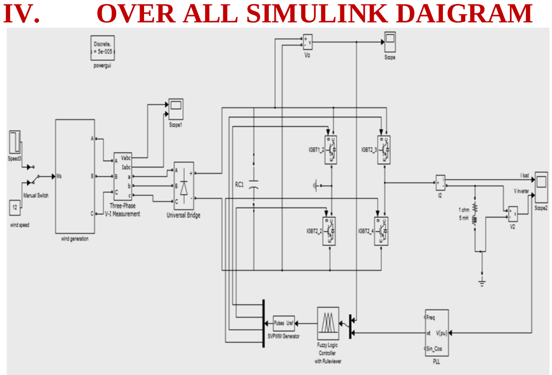
I-V curve



Constant voltage method Main article: Constant voltage method

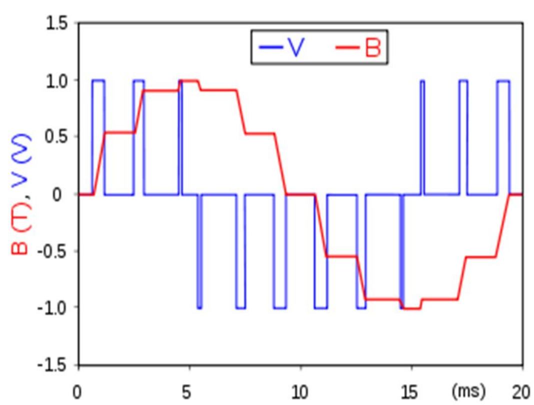
This method makes use of the fact that the ratio of maximum power point voltage to the open circuit voltage is often close to a constant value, with 0.76 being a common estimate. One problem with this method arises from the fact that it requires momentarily setting the PV array current to 0 to measure the array's open circuit voltage. The array's operating voltage is then set to (for example) 76 % of this measured value. But during the time the array is disconnected, the available energy is wasted. It has also been found that while 76 % of the open circuit voltage is often a very good approximation, it does not always coincide with the maximum power point.[5] Thus this method may not give as much efficiency as others, especially if conditions are highly variable or the physical behaviour of the cell deviates from expectations. Its main advantage is that it is relatively simple to implement and thus usually less expensive.

IV. OVER ALL SIMULINK DAIGRAM



V. SPACE VECTOR MODULATION

Main article: Space vector modulation Space vector modulation is a PWM control algorithm for multi-phase AC generation, in which the reference signal is sampled regularly; after each sample, non-zero active switching vectors adjacent to the reference vector and one or more of the zero switching vectors are selected for the appropriate fraction of the sampling period in order to synthesize the reference signal as the average of the used vectors,Pulse-width modulation



Pulse-width modulation (PWM), or **pulse-duration modulation (PDM)**, is a commonly used technique for controlling power to inertial electrical devices, made practical by modern electronic power switches. The average value of voltage (and current) fed to the load is controlled by turning the switch between supply and load on and off at a fast pace. The longer the switch is on compared to the off periods, the higher the power supplied to the load is. The PWM switching frequency has to be much faster than what would affect the load, which is to say the device that uses the power. Typically switching have to be done several times a minute in an electric stove, 120 Hz in a lamp dimmer, from few kilohertz (kHz) to tens of kHz for a motor drive and well into the tens or hundreds of k.Hz in audio amplifiers and computer power supplies. The term *duty cycle* describes the proportion of 'on' time to the regular interval or 'period' of time; a low duty cycle corresponds to low power, because the power is off for most of the time. Duty cycle is expressed in percent, 100 % being fully on. The main advantage of PWM is that power loss in the switching devices is very low. When a switch is off there is practically no current, and when it is on, there is almost no voltage drop across the switch. Power loss, being the product of voltage and current, is thus in both cases close to zero. PWM also works well with digital controls, which, because of their on/off nature, can easily set the needed duty cycle.

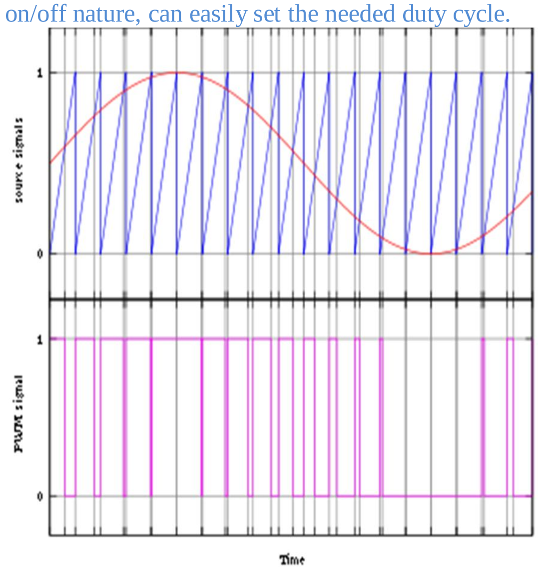


Fig. 2: A simple method to generate the PWM pulse train corresponding to a given signal is the interceptive PWM: the signal (here the red sine wave) is compared with a saw tooth waveform (blue). When the latter is less than the former, the PWM signal (magenta) is in high state (1). Otherwise it is in the low state (0).The simplest way to generate a PWM signal is the interceptive method, which requires only a saw tooth or a triangle waveform (easily generated using a simple oscillator) and a comparator. When the value of the reference signal (the red sine wave in figure 2) is more than the modulation waveform (blue), the PWM signal (magenta) is in the high state, otherwise it is in the low state

VI.FAST FOURIER TRANSFORM ANALYSIS(FFT)

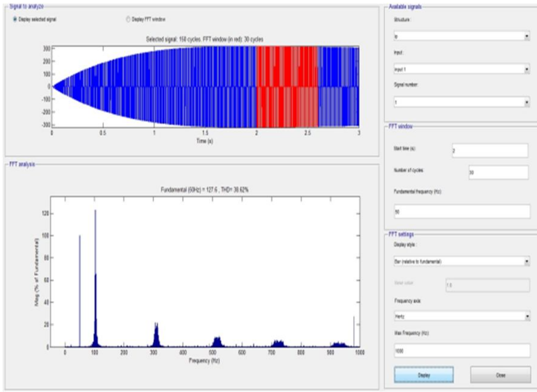


Fig. 6.1 fast fourier transform input analysis

In that analysis in Fig 6.1 input analysis for harmonic present in the input voltage for content 38.58% in shown on the diagram we can reduce the harmonic content using fuzzy and Dsc.

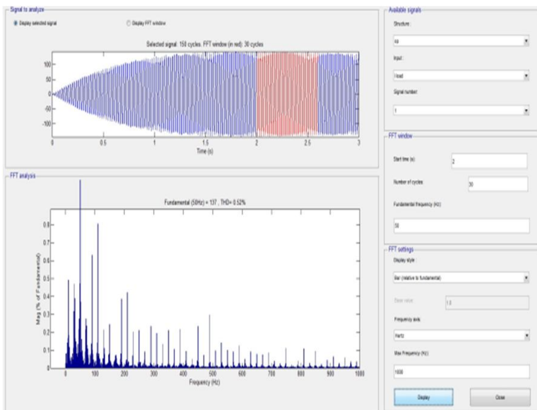


Fig. 6.2 fast fourier transform output analysis

Shown on the output diagram in Fig. 6.2 to reduce the harmonic content up to 0.52 % in the previous method harmonic content reduce only up to 1%

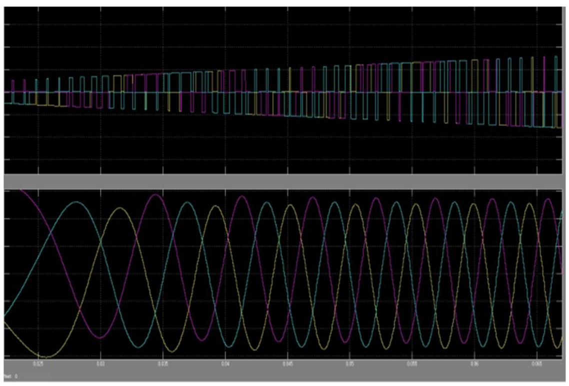


Fig 6.3 three phase output waveform

This diagram a shown on the output of three phase waveform, mainly windmill produce the output power shown on that voltage wave form.

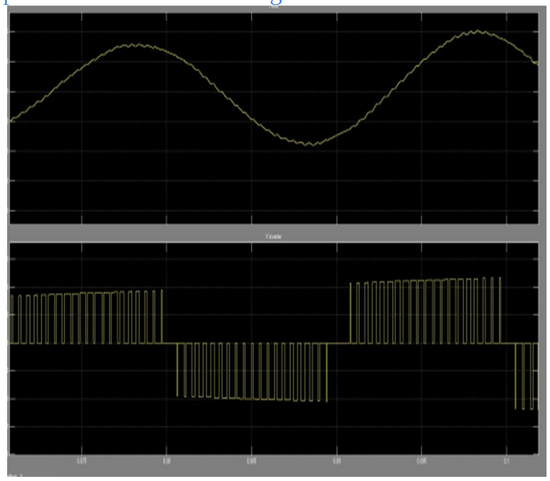


Fig 6.4 SVPWM Output waveform

It's mainly output of the simulation circuit in SVPWM, in the inverter current -10 to 16A and inverter voltage 0-42V in this spike.

VII. CONCLUSION

The design, simulation of WECS based on the modified PLL and the fuzzy logic controller and low cost DSC, SVPWM Generator and synchronization of the main grid function with PLL Algorithm, converter model integrated by IGBT model, MPPT and PLL were programmed system was connected in hardware integrated circuits in exiting method modified PLL algorithm in 32-50 ms in lock capacity, in suddenly change the phase voltage and frequency, 50-65ms to continue to the lock the signal of the PLL that very good response of the phase and frequency in previous THD level is 40 %, but this paper simulation result reduce the THD level to 38 %, after the simulation result we get reduce very low level output of harmonics up to 0.58 % to reduce the harmonic content of the output SVPWM (Space vector pulse width modulation. So we have very good output response.

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