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VIENNA RECTIFIER CONNECTED WITH PERMANENT MAGNET SYNCHRONOUS GENERATOR (PMSG)

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Abstract-*In this paper to design and implement the permanent magnet synchronous generator (PMSG) based wind energy conversion system (WECS) using with an Vienna rectifier. To integrated with grid with two back to back connected converters with a common DC link. The permanent magnetic synchronous generator (PMSG) which feeds alternating current (AC) power to the utility grid connection . In this paper a study of WECS is done by using a constant speed direct using MATLAB software. Even that dc link voltage at its reference value, the output ac voltage of the inverter can be kept constant. An effective control techniques to extract grid side controller also called voltage and current controller, three phase transformer.*

Keywords: Permanent magnet synchronous generator (PMSG), wind energy conversion system(WECS), converter using MOSETs based, DC link capacitor, three phase transformer.

1. INTRODUCTION

In the electrical power generation or an renewable energy sources, such as wind, is increasing because of environmental problem and shortage of an energy source. In that days of the extract power from the wind on a large industries.. The kinetic energy in the wind systems is converted into mechanical energy by the turbine by of shaft and gearbox arrange the different operating speed ranges of the wind turbine rotor with generator. The generator converts into a mechanical to electrical energy. Then generator part of PWM converter convert into a AC power into DC power, grid side converter convert this DC power into AC power to grid.

Permanent magnet are characterized as having large air gaps, which the reduce flux linkage multi-magnetic poles. The gearbox is due to low rotational Speed in the PMSG wind generation system, thus resulting in low cost.. In addition, permanents magnet synchronous generators (PMSGs) have a high torque of excitation losses. PMSG is gaining a lot of attention for WECS due to compact size, high reliability and higher power to weight ratio.

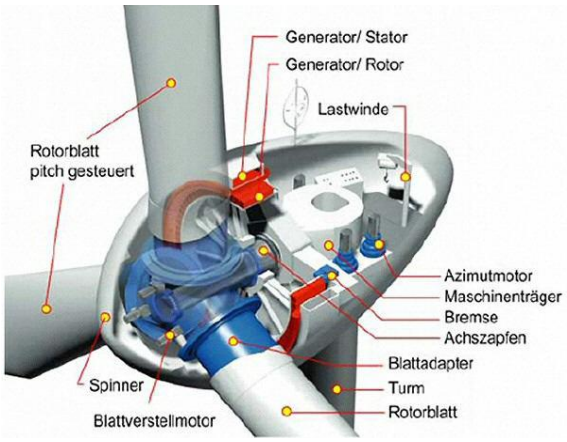

Fig. 1. Model of PMSG Wind Turbine

1.1 Structure of PMSG Wind Turbine

The basic of PMSG shown on Figure 1. The wind turbine generates from a torque from wind power. The generator produces a electrical and between the mechanical torque from the wind systems. The generator is connected to a three-phase inverter which rectifies the current from the generator to charge a DC-link capacitor, The DC-link three-phase inverter which is connected to the grid through a transformer. Through the control system, the information of wind speed three phase Vienna rectifier output is connected with the grid-side.

2. VIENNA RECTIFIER

In the three phase three switch level is called Vienna rectifier has been applied mostly as power supply. The Vienna rectifier can generate three phase voltage levels with power switches to control. In low power and low cost applications, the AC conversion is a diode bridge rectifier with capacitor and their voltage filter. For high power applications, the sinusoidal current must be active shaped by using either a type front-end converter or at the input. As wind generators as a energy source became used in this mode. Based on generator generates the variable three phase AC input voltage. In the three switch three phase and three levels VIENNA rectifier in the interfaces.

The Vienna rectifier consists of three switches MOSETs; It converts the AC voltage into control output voltage. It can also provide sinusoidal input currents and control output voltage. The AC voltage from the three phase generator is given to the Vienna rectifier. The current flows through the three MOSETs and the capacitors in the fully charged it. The phase current rises, through a MOSFETs, during that pulse period, charge the capacitor. When the MOSFETs is turned off, current through the diode upper or lower depending on direction of the current flow. By adjust the width of the pulse that turns ON the MOSFETs, corresponding line current is forced to be sinusoidal and in phase with the Voltage. When the MOSFETs is turned ON the corresponding phase is connected the line inductor, to the center point between the two output capacitors.

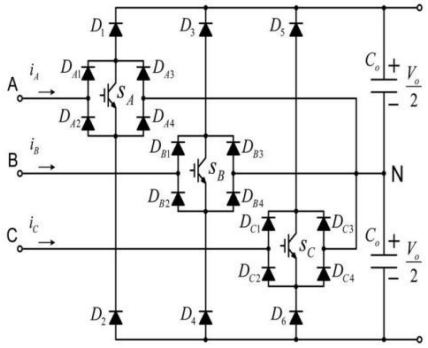

Fig. 2 : Vienna rectifier

3. PARAMETERS

Simulation parameters are as listed are:
The parameters are designed to get the output of desire levels. Simulation time is 5μS and switching frequency or frequency of repetitive sequence is 50 KHz for various input voltages the output is the valve for wind power generation and we get varying the input voltage.

Table 1: List Of Simulation Parameters And Its Values

Parameter	Symbol	Valve
Simulation time	Ts	5μF
Inductance	L	220mH
Load Capacitance	C	1000Nf
Resistor	R	500KΩ
Three phase Input Voltage	V_{in}	100-420V
Input Frequency	F	50HZ

4. CIRCUIT DIAGRAM OF VIENNA RECTIFIER IN SYNCHRONOUS CURRENT GENERATION

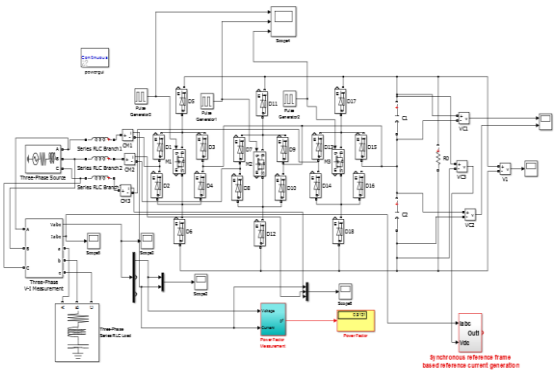

Fig. 3: Simulation Of Wind Energy Conversion System In MATLAB

4.1 Simulation And Result

The given simulation Output result gives us power factor input voltage and current across the capacitor, finally output.

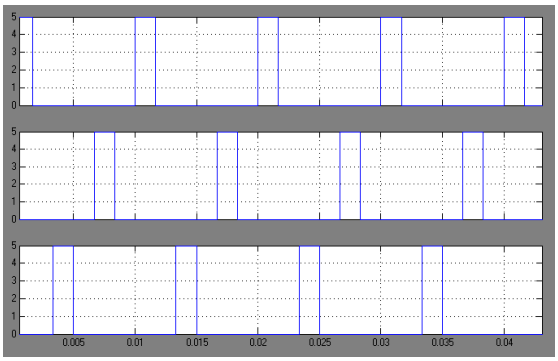

Fig. 4 : Three Phase Switching Waveform

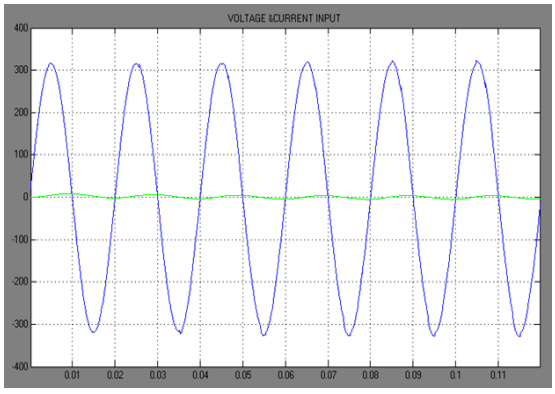

Fig. 5 : Phase A Input Voltage And Current Waveform

5. SUBSYSTEMS OF SYNCHRONOUS GENERATION

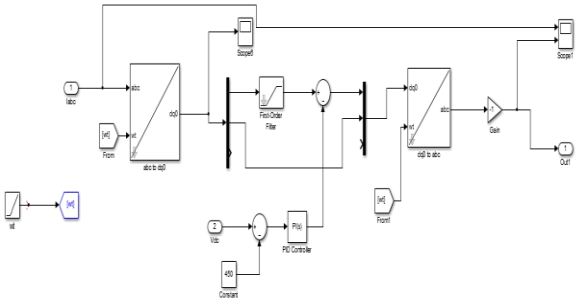

Fig. 6 : Synchronous Reference Frame Based Reference Current Generation

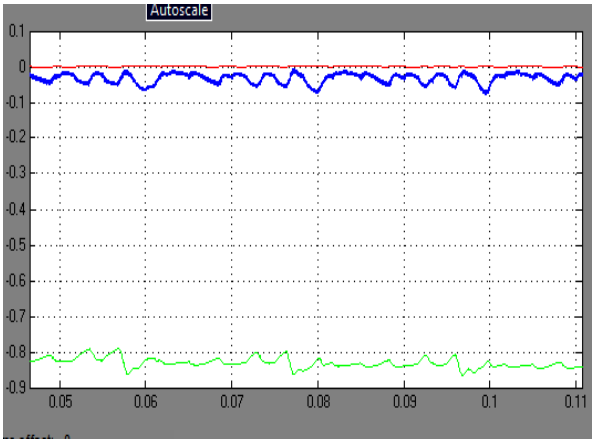

Fig. 7 : Reference Current Waveform

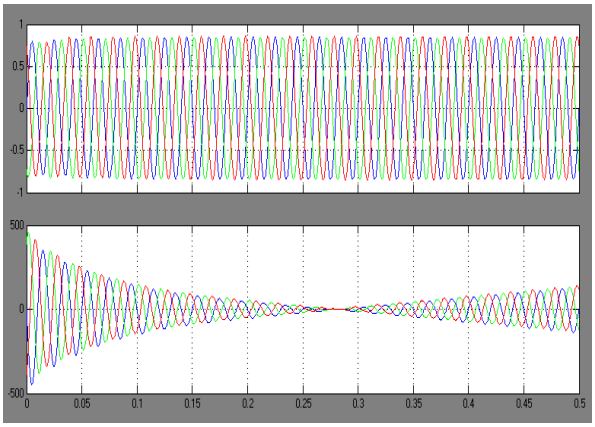

Fig. 8 : Reference Voltage And Current Generation

6. CONCLUSION

To analysis the control strategies and designs the simulation of system PMSG in AC power to the utility grid in Matlab. The simulation results show that the AC to connected the DC capacitor link output. DC-link voltage is kept at stable level for control of active and reactive power. Hence, the output will get the power supply for the systems.

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