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Design of High Efficiency Converter Fed Induction Motor Using Hybrid Renewable Energy System

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ABSTRACT

This work presents a new system configuration of the front-end converter stage for a hybrid wind/photovoltaic energy system. The aim of this project is to implement the high efficiency converter for the wind and solar hybrid system. In proposed system, consists of bridgeless SEPIC and converters zeta and mppt controllers both the sources to supply the load separately or simultaneously depending on availability. For the hybrid system, extracting as much energy from the wind and solar as possible and feeding the load with high quality electricity are the two targets. when a voltage disturbance occurs in distribution the system and it stays connected to the main grid boosting the DC voltage to a sufficient level using the converter and obtaining pure AC voltage from the inverter are the keys to realize the above targets. this configuration allows the two sources to supply the load separately or simultaneously, depending on the availability of the energy sources. The inherent nature of the zeta- bridgeless SEPIC converter is that additional input filters are not necessary to filter out high frequency harmonics. This project describes the closed loop mechanism of the zeta and bridgeless SEPIC converter, and the simulated result are presented

Keywords : Index terms: hybrid system, converter, wind generators, photo voltaic, Mppt controller, solar voltage sag.

I. INTRODUCTION

Now a days most of global warming and the depletion of fossil fuel reserves, many are looking at renewable energy system to preserve the earth for the future generation. Other than hydro power, wind and photovoltaic energy hold the most potential to meet our energy demands. wind energy ,by itself is capable of supplying large amounts of power, but its presence is highly unpredictable, as it can be here one moment and gone the next .similarly, solar energy is presents throughout the days, but the solar irradiation levels vary ,due to the sun intensity and unpredictable shadows cast by clouds ,birds ,tree, etc. the common inherent drawback of wind and photovoltaic systems, are their intermittent natures that make them unreliable. Hybrids renewable energy system utilizes two or more energy sources, usually solar and wind power. The main advantage of solar-wind system is that, when solar and wind power product used together reliability of the system. Today most of the electronic systems uses dc-dc converter. A zeta converter is fourth order dc-dc converter capable of amplifying and reducing the input voltage without inverting the polarities. At present and future, renewable option like solar and wind energy has been increasing interest in recent years. Reason is being that two capacitor and two inductor as dynamic storage elements. Pv system constitute an environmentally friendly alternative way for energy production using the energy from the sun. output power induced in the photovoltaic modules depends on solar radiation and temperature of the solar cells. To maximize the efficiency of the renewable energy system. It is necessary to track the maximum power point of the pv array. Maximum power point tracking method is achieved by using perturbation and observation method. In this paper, an alternative multi-input rectifier structure is proposed for hybrid wind-solar energy system. the proposed design is a fusion of the zeta-bridgeless SEPIC converter. The inherent nature of these two converter eliminates the need for separate input filters. The operations of these converter are compared with the separate parallel operation of the zeta-bridgeless SEPIC converter. The circuit operating principles will be discussed in this paper simulation results are provided to verify the proposed system

II. PROPOSED SYSTEM BLOCK DIAGRAM

The proposed block diagram consists a fusion of the zeta and bridgeless SEPIC converter. Where zeta converter is connected to the solar panel and bridgeless converter is connected to wind generator. The fusion of the two converters output is combined and it is given to the battery block. the inverter ac voltage is given to the load. Fusion of combined two converter output is given to the inverter. This configuration block diagram shown, allows each converter to operate normally, individually, in the event of one source being unavailable.

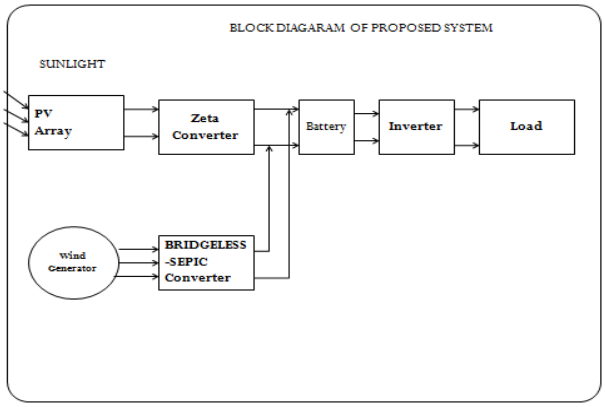

Figure 1 : Block diagram of the hybrid system

DESIGN OF CONVERTERS

The project system having the two type converter as the used of the system. they are zeta and bridgeless SEPIC converter. the two converter output is combined and given to battery and the battery output as given to the inverter. The inverter ac voltage is given to the load system.

ZETA CONVERTER

A zeta converter is a fourth order non liner system being that, with regard to energy input, it can seen as buck-boost-buck converter and with regard to the output, it can be seen as boost-buck-boost converter

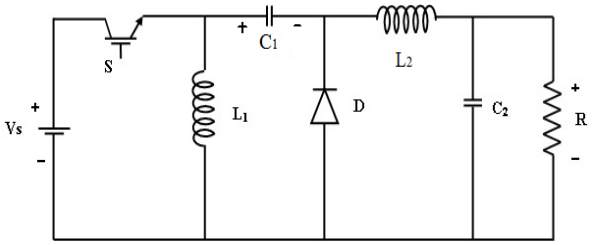

Figure 2 : Block diagram of zeta converter

BRIDGELESS SEPIC CONVERTER

The power factor correction is suffered from high conduction loss due to input bridge diode. the bridgeless SEPIC converter is used to avoid conduction loss…in switching period, the input voltage and achieved near unity power ‘

HYBRID SYSTEM WITH SEPARATE CONVERTERS CIRCUIT

The hybrid system with a separate circuit. this the converter are not fused, a separate circuit is connected parallel, the combined output is given to the battery, and the output of the inverter is given to the load .In this circuit, the input to the zeta is from solar energy, the three solar panels of 10000C degree temperature are connected in a series to get the input voltage of 71v.the switch is operated at a frequency of 50hz. By varying the duty ratio, the converter output was boosted to 270v.the output from the wind generator is given as an input to the bridgeless SEPIC converter. The output of wind generator is 46v DC is given to the SEPIC converter and the output is boosted to a voltage of 270v by varying the duty ratio.

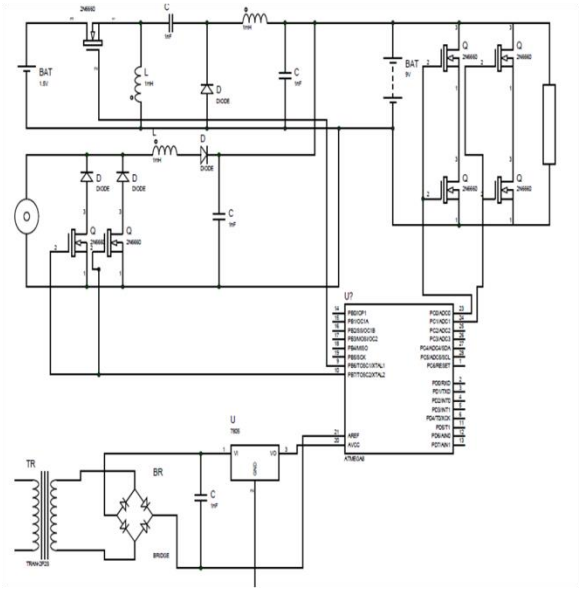

Figure 3. Hybrid system with separate converters in parallel with pwm controllers

Both the converter are combined in parallel to get the output voltage of 270v, the dc output voltage is given as input to a single phase inverter to a voltage of 270v

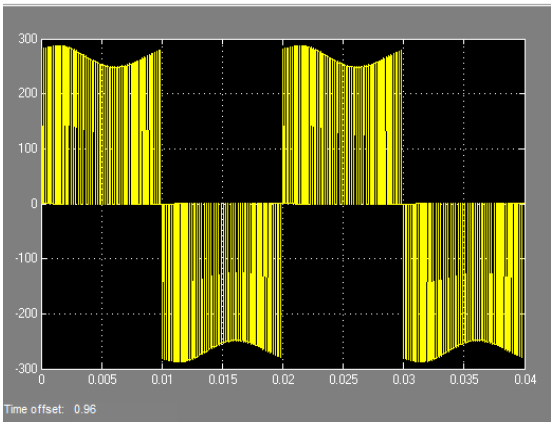

Figure 4 : output of the hybrid separate converter system

HYBRID SYSTEM WITH THE COMBINED CONVERTER CIRCUIT WITH R LOAD

A system diagram with fused converter where one of the input is connected to the output of the pv array of 1000 temperature and the output connect of a generator of 46v dc

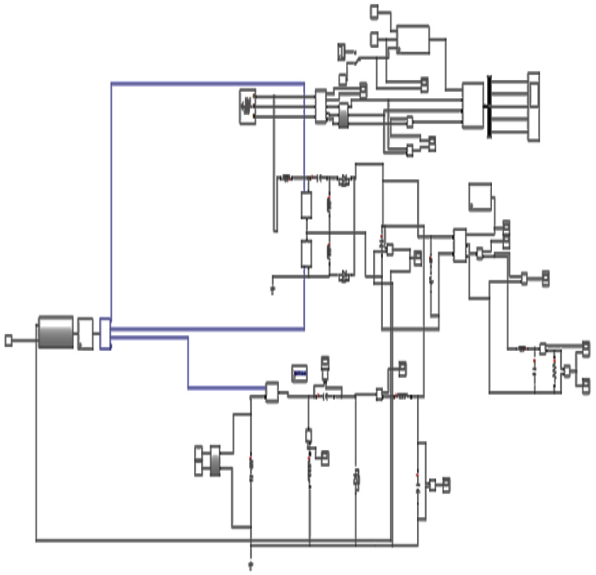

Figure 5 : simulation of hybrid system with the combined converter circuit with R load

The fusion of two converter is achieved by, reconfiguring the two existing diodes from each converter, and the shared utilization of the zeta output induction by the bridgeless SEPIC converter. his configuration allows each converter to operate normally, individually, in the event of one source being unavailable.

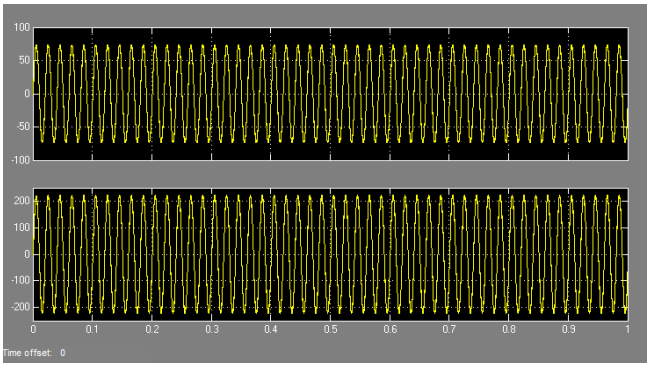

Figure 6 : output of hybrid system of R load

III. CONCLUSION

The complete model of the proposed system IS presented and designed, using the zeta and bridgeless SEPIC converters for various load conditions and also with source and load side disturbance. The control strategy of the hybrid system is discussed for the unbalanced voltage sag condition. From the simulation results shown. it is seen that the closed loop performance is better when compared with the open

loop system, which is able to tolerate various voltage sag conditions.

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