

Analyzing Integrated Renewable Energy And Smart-Grid Systems by Using Wireless Power Transfer

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ABSTRACT: Increasing the use of electric vehicles (EVs) is regarded as a step in the right direction to reduce air pollution and carbon emissions. However, a dramatic increase of EV and charging stations has raised voltage quality and harmonic distortion issues that affect the performance of integrated renewable power sources (wind and solar) and smart-grid electrical transmission networks. This paper models an integrated electric vehicle charging and battery storage system operating in the presence of unpredictable wind and solar power sources. In this paper, WPT (Wireless Power Transfer) is used to reduce the harmonics distortion and to stabilize the voltage level. Simulations are performed to evaluate energy management by the proposed control system. The proposed system effectively manages the electric power on the grid by drawing power from reducing the load on the converter and enabling the reduction of charging time for electric vehicles. A constant voltage is achieved on the grid irrespective of fluctuations in renewable energy generation and in the load.

KEYWORDS: Electric Vehicle, Wireless Power Transfer, Smart grid,

I. INTRODUCTION

The design and implementation of a wireless power transmission system for industrial purpose was executed in this paper. The system will work by using resonant coils to transmit power from an AC line in the ceiling to various devices. The major objective is to achieve Wireless power transfer via three phase transformer to transmitting and receiving supply in the near field.

Electricity by today's standards is considered essential to life. Electricity has been the fuel for technological development. Wireless Power Transfer is exactly what the name states, to transfer electrical power from a source to a device without the aid of wires. The founder of AC electricity, Nikola Tesla, was first to conduct experiments dealing with WPT.

Wireless energy transfer or wireless power transmission is the process that takes place in any system where electrical energy is transmitted from a power source to an electrical load without interconnecting wires. Wireless transmission is useful in cases where instantaneous or continuous energy transfer is needed but interconnecting wires are inconvenient, hazardous, or impossible. Wireless power transfer can make an extraordinary change in the field of the electrical engineering which eliminates the use of conventional copper cables and current carrying wires. Based on a concept, the project is developed to transfer power within a small range. The power is transferred without any connection. Current wireless power transmitters are capable of transmitting current at distances of up to one foot. These distances allow for use in small consumer electronic devices. Nikola Tesla, who is seen by as the "Father of Wireless", is also credited for his remarkable AC generation and was the first person to conceive the idea of wireless power transmission and successfully demonstrated the transmission of electricity without wires.

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The overall goal of this project is to design and successfully implement a wireless power transmission system for residential purpose. The system will work by using resonant coils to transmit power from an AC line in the ceiling to various devices. The major objective is to achieve Wireless power transfer via resonant inductive coupling between the transmitting and receiving coils in the near field. To demonstrate that power is successfully transferred wirelessly, an LED, a battery and a DC fan is used. There are several benefits for the use of such a system:

1. Elimination of cords on the ground that make tripping hazards.
2. Allows no wire installation
3. A necessary step towards consumer wireless power.

II. LITERATURE SURVEY

Asif Khan et al.[1] In this paper he says that Increasing the use of electric vehicles (EVs) is regarded as a step in the right direction to reduce air pollution and carbon emissions. This paper models an integrated electric vehicle charging and battery storage system operating in the presence of unpredictable wind and solar power sources. The aim is to enable the design of an electrical control system that develops the correct duty cycle to stabilize and regulate the voltage at the dc/dc power conversion station. Simulations are performed to evaluate energy management by the proposed control system.

The proposed system effectively manages the electric power on the grid by drawing power from the batteries at peak times and then charging them in off-peak times, reducing the load on the converter and enabling the reduction of charging time for electric vehicles. A constant voltage is achieved on the grid irrespective of Fluctuations in renewable energy generation and in the load.

Omar Hafez et al. [2] this paper presents a mathematical model for representing the total charging load at an electric vehicle charging station (EVCS) in terms of controllable parameters; the load model developed using a queuing model followed by a neural network (NN). The queuing model constructs a data set of plug-in electric vehicle (PEV) charging parameters which are input to the NN to determine the controllable EVCS load model. The queuing model considers arrival of PEVs as a non-homogeneous Poisson process, while the service time is modeled considering detailed characteristics of battery.

The smart EVCS load is a function of number of PEVs charging simultaneously, total charging current, arrival rate, and time; and various class of PEVs. The EVCS load is integrated within a distribution operations framework to determine the optimal operation and smart charging schedules of the EVCS. Objective functions from the perspective of the local distribution company (LDC) and EVCS owner are considered for studies. A 69-bus distribution system with an EVCS at a specific bus, and smart load model is considered for the studies. The performance of a smart EVCS vis-à-vis an uncontrolled EVCS is examined to emphasize the demand response (DR) contributions of a smart EVCS and its integration into distribution operations.

Zhong Chen et al.[3] The accurate modeling of the charging characteristics of electric vehicles (EVs) is the basis for the load forecasting, infrastructure planning, and orderly charging management. While, research based on the measured charging data of EVs is seldom carried out, and the concrete modeling of the correlations of various parameters is a gap in the knowledge. Aiming at this, we carried out an investigation based on operational data, from August 2016 to August 2017, of an EV charging service company in Nanjing, China.

The time-energy characteristics of EV charging behavior can be described using the probability distributions and correlations of three charging parameters, i.e., charging start time, charging duration, and charged capacity. In this paper, we the probability densities of these charging parameters using the kernel estimation method and verified the correlations of time parameters of the charging behavior. Multiple copula functions were used to model the correlation between the time and energy parameters of different types of charging behaviors.

On this basis, we also carried out stochastic simulation for the load curve of disordered charging and analyzed the potential of the EV charging load participating in the orderly management and its coordination with the output of power generation using renewable energy.

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Pablo García-Triviño et al.[3] As already happens with the electric vehicles (EVs) expansion, technology associated with their charge also must be improved. This paper presents a novel decentralized control method for charging stations based on a medium-voltage direct-current (MVDC) bus. This kind of charging stations is integrated in a micro grid with a PV system, a battery energy storage system, a local grid connection and two units of fast charge. The main contribution of this work resides in the cited decentralized control method based on fuzzy logic that includes the state of charge of the battery energy storage system as a control variable. This control contains two independent fuzzy logic systems (one for the battery energy storage system and other for the grid), whose function is to maintain the MVDC voltage and the battery energy storage system state-of-charge within proper thresholds and to keep the power balance stable among the units of fast charge and the rest of the charging station components. The new control method was tested in a considerable number of operating situations (two hundred cases studied) under different conditions of sun irradiance, initial state-of-charge of battery energy storage system and number of EVs connected to the charging station with the objective of showing its correct performance in all the considered scenarios.

Kalpesh Chaudhari et al.[4] Electric Vehicle (EV) charging stations will play an important role in the smart city. Uncoordinated and statistical EV charging loads would further stress the distribution system. Photovoltaic (PV) systems, which can reduce this stress, also show variation due to weather conditions. In this paper, a hybrid optimization algorithm for energy storage management is proposed, which shifts its mode of operation between the deterministic and rule-based approaches depending on the electricity price band allocation.

The cost degradation model of the energy storage system (ESS) along with the levelized cost of PV power is used in the case of EV charging stations. The algorithm comprises of three parts: categorization of real-time electricity price in different price bands, real-time calculation of PV power from solar irradiation data and optimization for minimizing the operating cost of EV charging station integrated with PV and ESS.

Extensive simulation study is carried out with an uncoordinated and statistical EV charging model in the context of Singapore to check effectiveness of this algorithm. Furthermore, detailed analysis of subsidy and incentive to be given by the government agencies for higher penetration of renewable energy is also presented. This work would aid in planning of adoption of PV integrated EV charging stations which would expectedly replace traditional gas stations in future.

Y. V. P. Kumar et al.[5] The power quality and resiliency (or self-healing capacity) characteristics of a renewable energy based micro grid (REM) are limited majorly due to their inherent dependency on the static power electronics based energy conversion devices.

Whereas, conventional electrical machines based power plants possess good power quality and resiliency characteristics due to their high inertia and control features. So, the REMs' research need to be shifted towards making its operation similar to conventional electrical machines based power plant. With this intent, this paper proposes two DC/AC energy conversion schemes that are designed based on the theory of electrical machines such as DC Motor (DCM) and Doubly Fed Induction Generator (DFIG).

The first scheme is a rotary inverter (named as RDCMIGI) that replaces the conventional static power electronic inverter with a real DCM-DFIG set. The second scheme is a static inverter (named as VDCMIGI) that uses a pulse width modulated power electronic inverter, whose modulating signals are generated through a closed loop virtual DCM-DFIG based control system.

These two schemes emulate the behavior of electrical machines based conventional power plant in REM, which leads to the improvement of power quality through the smooth control of voltage/frequency and resiliency through the injection of necessary moment of inertia. For the analysis, the conventional/proposed energy conversion schemes are modeled in MATLAB/Simulink® and are tested during various uncertainties. From the results, it is observed that the proposed DC/AC energy conversion schemes have effectively improved the power quality and resiliency, and thereby, leverages REMs as better future grids.

Y. Shi et al. [6] This paper proposes a grid-tied photovoltaic (PV) system consisting of modular current-fed dual-active-bridge (CFDAB) dc-dc converter with cascaded multilevel inverter. The proposed converter allows a small dc-link capacitor in the three-phase wye-connected PV system; therefore, the system reliability can be improved by

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replacing electrolytic capacitors with film capacitors. The low-frequency ripple-free maximum power point tracking (MPPT) is also realized in the proposed converter. First of all, to minimize the influence resulting from reduced capacitance, a dclink voltage synchronizing control is developed. Then, a detailed design of power mitigation control based on CF-DAB dynamic model is presented to prevent the large low-frequency voltage variation propagating from the dc-link to PV side. Finally, a novel variable step-size MPPT algorithm is proposed to ensure not only high MPPT efficiency, but also fast maximum power extraction under rapid irradiation change.

A downscaled 5-kW PV converter module with a small dc-link capacitor was built in the laboratory with the proposed control and MPPT algorithm, and experimental results are given to validate the converter performance.

K. S. H. Beagam et al. [7] Increasing demand for electrical power as a result of modern civilization has imposed challenges such as voltage instability, transmission loss, and power factor fluctuations on power systems. In an attempt to solve these challenges, FACTS devices were employed. This paper presented the application of Static Var Compensator to the Nigerian 330kV Power Network to study its effect on the system's active transmission loss. SIMULINK/MATLAB was used to model the Nigerian 330kV Power Network and the SVC. The simulation result showed that by applying the Static Var Compensator, the systems total active transmission loss was reduced by 31.79%. From the above percentage reduction and the pattern of the associated chart and graph, it was observed that SVC could be used for active transmission loss minimization in power systems.

III. RENEWABLE ENERGY SOURCE

3.1 INTRODUCTION

Renewable energy is becoming more and more prevalent around the world, but it is still not the dominant energy resource. Since the industrial revolution began in the 18th century, we have been burning fossil fuels such as oil, coal and natural gas to fuel our homes, businesses and transport. However, while fossil fuels have enabled huge economic growth and technological evolution. We now know that it has also damaged our environment as the burning of fossil fuels produces carbon emissions.

Renewable energy is energy that can be reproduced in a short period of time. Renewable energy is energy that can be reproduced in a short period of time. The 6 most prevalent forms of renewable energy are solar, air/wind, biomass, hydro power, geothermal and bio-fuels. Each of these renewable energy sources provides an alternative to traditional energy generation. In this paper, solar and wind energy are used as renewable energy sources.

3.2 SOLAR ENERGY:

Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photo voltaic, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis .Solar power is the conversion of energy from sunlight into electricity, either directly using photo voltaic(PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam.

The PV Power tech solar photo voltaic module provides superior value and performance. They may be used in single-module and multiple module systems to meet the current or voltage requirements of a wide range of applications with its nominal power; it's well-suited to utility grid systems and traditional applications.

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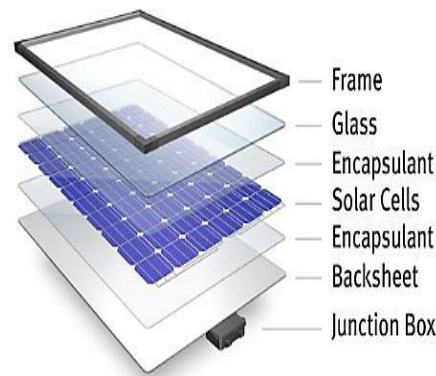


Figure 1 Structure of PV module

The figure 3 represents the structure of PV module. The high efficiency Solar PV Modules are:

- Made from imported Poly-Crystalline solar cells to exacting International Standards
- Modules comply with the International standards IEC 61215, IEC 61730 and IEC 61701 product certification
- Standard 10 year manufacturing warranty
 - 10 years/25 years limited power guarantee for 90% & 80% power respectively
- Cells are encapsulated with premium EVA from USA, with good light transmission resistance to degradation over a long period of time
- Structural integrity offered by a robust double wall screw-less, snap-fit aluminum frame that is anodized for safety against corrosion.

PARAMETRS	VALUES
Short circuit current (I_{SC})	2.54 A
Open circuit voltage	21.8 V
Irradiance	1000 w/m ²
Quality factor(N)	1.6
Series Resistance	5.1e ⁻³ ohm

Table 1.Parameters of PV module

3.2.1 WORKING PRINCIPLE

Solar photovoltaic (PV) system is like any other electrical power generation systems in terms of the output except for the source of the power is solar radiation. The conversion of solar radiation to the electrical power is based on the photovoltaic principles. However, the principles of operation of the connected load and interfacing with other electrical systems remain the same. Though solar PV array produces power when exposed to sunlight, a number of other components are required to properly conduct, control, convert, distribute, and transform the energy produced by the array.

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3.2.2 MAXIMUM POWER POINT TRACKING

Maximum Power Point Tracking, frequently referred to as MPPT, is an electronic system that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are capable of. In fig 3.4 represents MPPT is not a mechanical tracking system that “physically moves” the modules to make them point more directly at the sun. MPPT is a fully electronic system that varies the electrical operating point of the modules so that the modules are able to deliver maximum available power. Additional power harvested from the modules is then made available as increased battery charge current. The figure 2 describes the MPPT diagram



Figure 2.MPPT diagram

As the amount of sunlight varies, the load characteristic that gives the highest power transfer efficiency changes, so that the efficiency of the system is optimized when the load characteristic changes to keep the power transfer at highest efficiency. This load characteristic is called the maximum power point (MPP) and MPPT is the process of finding this point and keeping the load characteristic there. The figure 3 shows the simple circuit diagram with MPPT.

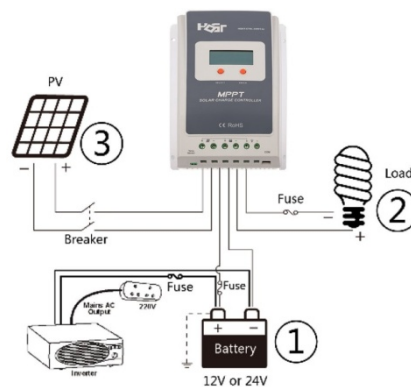


Figure 3.Circuit Diagram with MPPT

Advantages:

1. Simplicity: This algorithm solves one linear equation. Therefore, it does not consume much computational power.
2. Can be implemented as analog or digital circuits.
3. Since temperature varies slowly with time, there are no steady-state oscillation and instability.

3.3 WIND ENERGY:

Wind power is the use of air flow through wind turbines to provide the mechanical power to turn electric generators. Wind power, as an alternative to burning fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, consumes no water, and uses little land.

WIND GENERATION:

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The circulation of air in the atmosphere is caused by the non-uniform heating of the earth's surface by the sun. The air immediately above a warm area expands, it is forced upward by cool, denser air which flows in from surrounding areas causing wind. The nature of the terrain, the degree of cloud and the angle of the sun in the sky are all factors which influences this process.

In general, during the day the air above the land mass tends to heat up more rapidly than the air over water. In coastal regions this manifests itself in a strong onshore wind. At night the process is reversed because the air cools down more rapidly over the land and the breeze therefore blows off shore. Despite the wind's intermittent nature, wind patterns at any particular site remain remarkably constant year by year. Average wind speeds are greater in hilly and costal area than they are well inland. The winds also tend to blow more consistently and with greater strength over the surface of the water where there is a less surface drag.

3.3.1 THE POWER IN WIND

Wind possesses energy by virtue of its motion. Any device capable of slowing down the mass of moving air, like a sail or propeller, can extract part of the energy and convert it into useful work.

There are three factors determine the output power generated from the wind mill, they are

- (1) The wind speed
- (2) The cross section of wind swept by rotor, and
- (3) The overall conversion efficiency of rotor, transmission system and generator or pump.

No device, however well-designed, can extract all of the wind's energy because the wind would have to be brought to a halt and this would prevent the passage of more air through the rotor. The most that is possible is for the rotor to decelerate to whole horizontal column of intercepted air to about one-third of its free velocity.

A 100% efficient aero generator would therefore only be able to convert up to a maximum of around 60% of the available energy in wind into mechanical energy. A well-designed blades will typically extract 70% of the theoretical maximum, but losses incurred in the gear box, transmission system and generator or pump could decrease overall wind turbine efficiency to 35% or less.

3.3.1.1 CALCULATION OF POWER IN THE WIND

The power in the wind can be computed by using of Kinetics (Kinetic means relating to or resulting from motion). The wind mill works on the principle of converting Kinetic energy of the wind to mechanical energy.

We know that power is equal to energy per unit time. The energy available is the kinetic energy of the wind. The kinetic energy of any particle is equal to one half its mass times the square of its velocity.

$$\text{i.e., Kinetic Energy of particle} = \frac{1}{2} mv^2 \quad \dots (5.1)$$

Kinetic Energy of particle = $\frac{1}{2} mv^2$

Where

M : Mass of particle (kg)

V : Velocity of particle (m/s)

The amount of air passing in unit time, through an area 'A', with velocity 'V' is A x V, and its mass 'm' is equal to its volume multiplied by its density 'ρ' of air.

$$\text{i.e., } m = \rho AV \quad \dots (5.2)$$

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3.4 WPT:

In figure 4 represents the AC source voltage supplies the ac voltage at input of the coil. But before directly applying it to the coil a high frequency transformation is performed by which the frequency gets increased from 50Hz to several KHz. This is effectively done in order to achieve long distance and to reduce the power consumption.

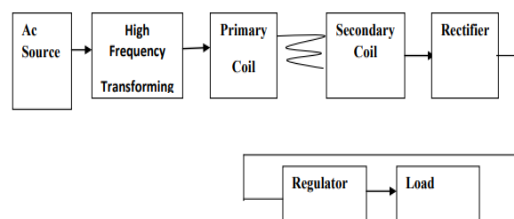


Figure 4. Block diagram of WPT

This frequency transformation is done by using switching devices by which alternately the devices can be made to generate the pulses and given as input to transmitting inductor (primary coil) & the voltage flow through this coil is in the form of electromagnetic waves which is then transmitted towards receiving inductor(secondary coil).

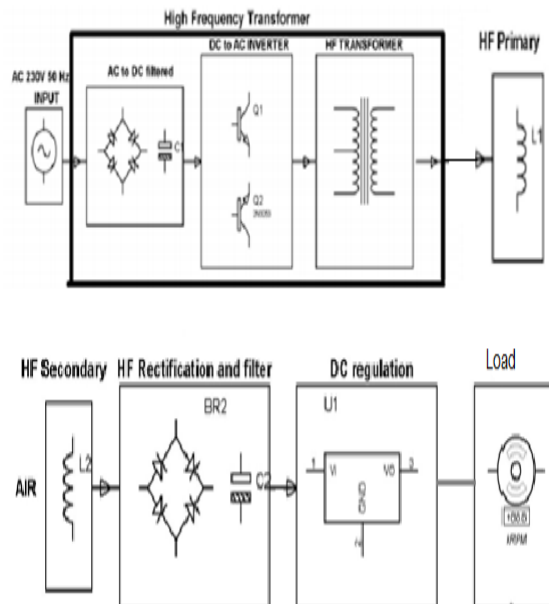


Figure 5. Schematic Diagram of WPT

The receiving inductor (secondary coil) is used to receive the electromagnetic waves which produce the voltage inside the coil which is in AC form. The figure 5 represents this voltage passed through rectifier & filter circuitry which converts the AC voltage in DC form & removes the unwanted contents using filter. This circuit used to provide smooth DC voltage. The received voltage may be in unregulated form which must be regulated using Voltage regulator so at the output we get regulated DC voltage. This regulated voltage is then given to the load which drives it.

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3.5 BLOCK DIAGRAM

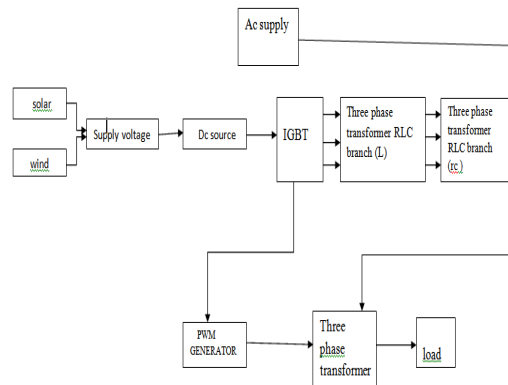


Figure 6. Block diagram

The figure 3 shows the block diagram which has Solar and wind as a source. The Block has IGBT and Three phase Transformer and load.

3.5 IGBT:

The Insulated Gate Bipolar Transistor (IGBT) is a minority-carrier device with high input impedance and large bipolar current-carrying capability. Many designers view IGBT as a device with MOS input characteristics and bipolar output characteristic that is a voltage-controlled bipolar device. To make use of the advantages of both Power MOSFET and BJT, the IGBT has been introduced. It's a functional integration of Power MOSFET and BJT devices in monolithic form. It combines the best attributes of both to achieve optimal device characteristics. The IGBT is suitable for many applications in power electronics, especially in Pulse Width Modulated (PWM) servo and three-phase drives requiring high dynamic range control and low noise. It also can be used in Uninterruptible Power Supplies (UPS), Switched-Mode Power Supplies (SMPS), and other power circuits requiring high switch repetition rates. IGBT improves dynamic performance and efficiency and reduced the level of audible noise. It is equally suitable in resonant-mode converter circuits. Optimized IGBT is available for both low conduction loss and low switching loss

3.6 THREE-PHASE TRANSFORMERS:

Transformers used in three-phase systems may consist of a bank of three single phase transformers or a single three-phase transformer which is wound on a common magnetic core. A three-phase transformers wound on a common core offers advantages over a bank of single-phase transformers. A three-phase transformers wound on a common core is lighter, smaller and cheaper than the bank of three single-phase transformers. The common core three-phase transformer also requires much less external wiring than the bank of single-phase transformers and can typically achieve a higher efficiency. The bank of three single-phase transformers does offer the advantage of flexibility. In the case of an unbalanced load, one or more transformer in the bank can be replaced by a larger or smaller kVA-rated transformer. In terms of maintenance, a malfunctioning transformer in the bank of transformers can be easily replaced while the entire common core three-phase transformer would require replacement. The bank of single-phase transformers or the common core three-phase transformer can be connected in one of four combinations relative to the primary and secondary connections.

- Wye-Delta: Commonly used in a step-down transformer, wye connection on the HV side reduces insulation costs, the neutral point on the HV side can be grounded, stable with respect to unbalanced loads.
- Delta-Wye: Commonly used in a step-up transformer for the same reasons as above.
- Delta-Delta: Offers the advantage that one of the transformers can be removed while the remaining two transformers can deliver three-phase power at 58% of the original bank.

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- Wye-Wye: Rarely used, problems with unbalanced

IV. SOFTWARE DEVELOPEMENT

4.1 SOFT SWITCHING:

The benefits of this zero voltage resonant transition (ZVRT) control are double. One is less heat sinking requirement and the other is that a higher switching frequency can be implemented for further reduction of the inductor size. The major additions are the need for twice switching elements and the addition of snubber capacitors that may introduce some tail current during turnoff condition. The figure7 shows the flowchart of soft switching Technique. The figure 8 shows the Measurement of soft switching technique.

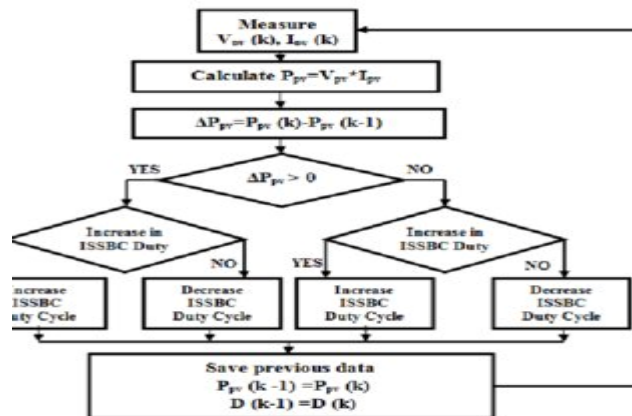


Figure 7 .Flow chart of soft switching technique

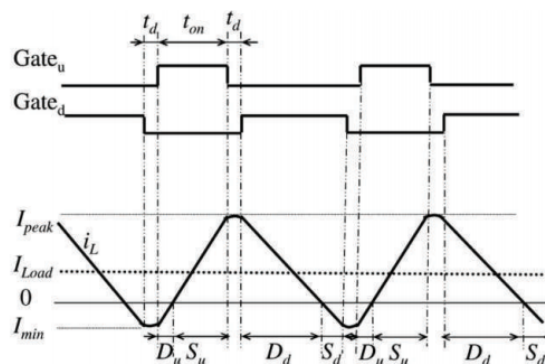


Figure 8 .Measurement of soft switching technique

4.1.1 SOFT SWITCHING AC TO DC CONVERTER WITH SINGLE POWER CONVERSION

The dc–dc converter is derived from a current-fed push–pull converter. It employs an active clamp circuit and a series resonant circuit. The active-clamp circuit is composed of the auxiliary switches S1a, S2a and the clamping capacitor Cc.

The active-clamp circuit increases conversion efficiency by reducing the switching losses on the switches and by recycling energy stored in the leakage inductance Llk. Moreover, this circuit limits voltage stresses across the switches and avoids damage caused by surge voltage. The series resonant circuit consists of the leakage inductance Llk and a

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voltage doubler rectifier circuit. This resonant circuit alleviates the reverse recovery problem on the rectifier diodes D1 and D2 by providing zero-current switching (ZCS) turn-off for the diodes.

4.1.1.1 Operation Principle:

The proposed converter regulates the input current and output power by adjusting the pulse width-modulation (PWM) signals of the switches. The main switches S1 and S2 have the same duty D, and their PWM signals are generated with a 180° phase difference. S1a (S2a) operates complementarily to S1 (S2) with a short dead-time.

To analyze the steady-state operation of the proposed converter, several assumptions are made as follows:

- All switches S1, S2, S1a, and S2a are considered to be ideal switches except for their body diodes.
- As the switching frequency f_s is much higher than the grid frequency f_g , it is assumed that the input voltage V_i is constant during one switching period T_s .
- For symmetric operation, Cr1 is identical to Cr2.
- The clamp capacitors C_c and the output capacitor C_o are sufficiently large to make the clamp capacitor voltage V_c and the output voltage V_o constant.
- The transformer T is composed of an ideal center-tap transformer with the primary winding turns N_p , the secondary winding turns N_s , the magnetizing inductance L_m , and the leakage inductance L_{lk} on the secondary side.

The operational region is determined by whether or not the duty D is less than 0.5. During the half switching period in the region for which $D < 0.5$, six operational modes exist during one switching period. However, the symmetrical operation of the circuit makes it possible to understand the steady-state operation in this region by analyzing only half a period.

4.1.2 SOFT-SWITCHING CONTROL:

Soft-switching control In order to achieve high-power density, the converter can be designed to operate in discontinuous conducting mode (DCM) such that the passive inductor can be minimized, affecting the converter size. The DCM operation introduces a large current ripple, so it is necessary to interleave multiple phases to cancel the high-frequency switching current ripple, as previously mentioned. Another major advantage of this operation mode is that zero turn-on loss and thus low diode reverse recovery loss can be achieved. However, the DCM operation largely increases turnoff loss because the main switch is turned off at twice the load current or higher.

Another important issue is the inductor current parasitic ringing due to the inductor oscillation with the device output capacitance during turn-off. For those reasons in this paper each phase has been realized by a synchronous buck converter composed by two complementary IGBTs with a snubber capacitor in parallel. In this case, the inductor current, rather than operating in a traditional DCM condition, goes from positive to negative direction and then swings back to positive. It is easily demonstrated that the diode turns off naturally without having reverse recovery loss and the parasitic ring is also fully avoided. Soft-switching buck operation mode The benefits of this zero voltage resonant transition (ZVRT) control are double. One is less heat sinking requirement and the other is that a higher switching frequency can be implemented for further reduction of the inductor size.

4.2 MATLAB-INTRODUCTION

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

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V. RESULT AND DISCUSSION

5.1 MATLAB CIRCUIT

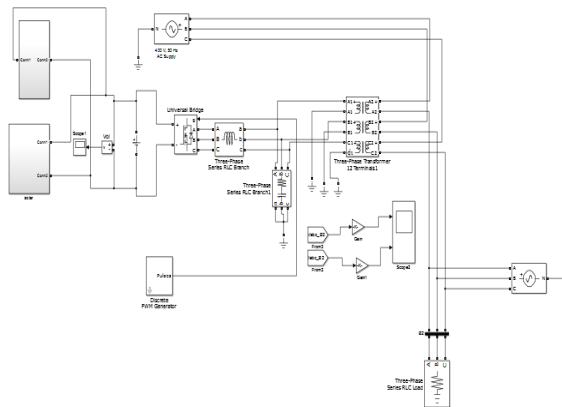


Figure 9. Matlab model

In Fig 9 Represents the mat lab Simulink diagram. The block diagram explained as solar panel produce dc source using boost converter and wind produces ac source using converter it can be formed to dc source. These two dc source given to the IGBT it will produce 120vdc supply. Three phase RLC branch range produce required voltage. Here three phase transformer will be acts as wireless power transfer the required voltage given to the grid and load

5.2 OUTPUT

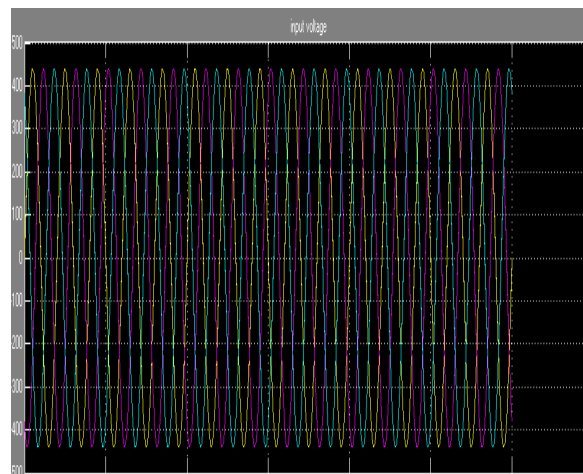


Figure 10. Waveform of Input Voltage

The figure 10 shows the waveform of input voltage.

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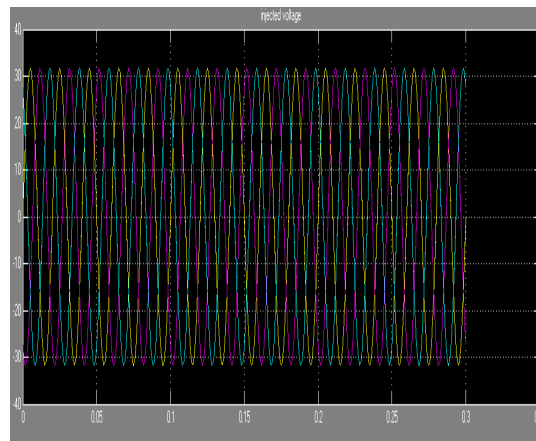


Figure 11.Waveform of Injected Voltage

The waveforms(10,11) represents the input voltage and output voltage in sine wave without any harmonic distortion

5.3 WIND WAVEFORM

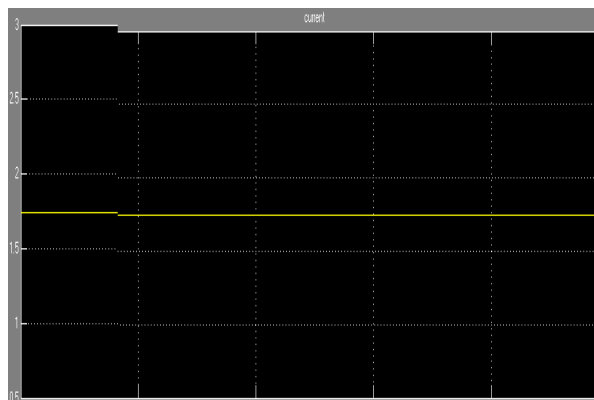


Figure12. Waveform of wind current

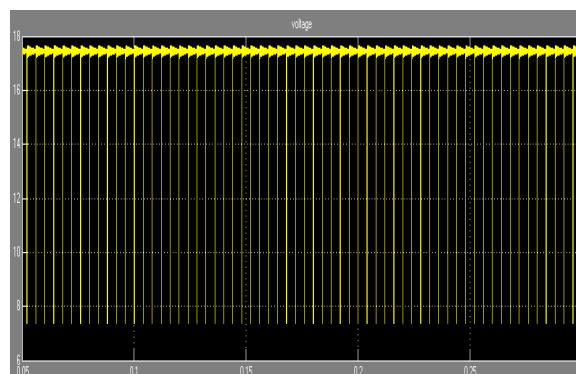


Figure13. Waveform of wind voltage

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The waveforms of wind voltage and current was described in figure 12,13.

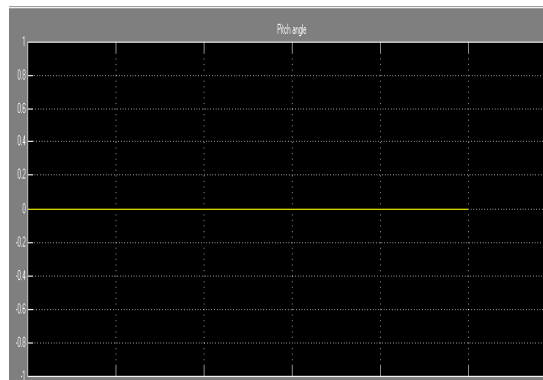


Figure 14. Waveform of wind pitch angle

The figure 14 shows the waveform of wind pitch angle. The waveform of wind speed was shown in figure 15.

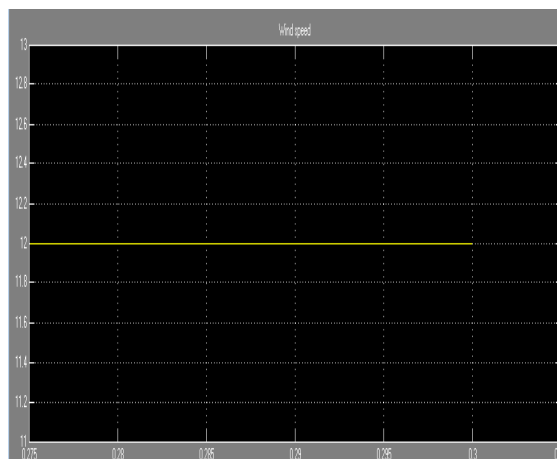


Figure 15. Waveform of wind speed

VI. CONCLUSION AND FUTURE SCOPE

This research presents a wireless AC-to-DC power transfer over a short distance. The complete system is developed and simulated using MATLAB software. The major components in the system are designed using IGBT and continuous waved ac pulses are generated. In addition, two inductive coils are modeled and simulated for wireless power transfer. The whole system is simulated in the near field domain, in which the field energy itself is non-radiative. Taking the advantage of this fact, wireless power transmission via inductive coupling circuit is implemented and arrived at a reasonable efficiency for different load resistances. Each modules are simulated separately and their transient output waveforms are analyzed.

The result of phase 1 will take over to next level by designing electric vehicle stations with effective and efficient modeling .To analyze rating capacity of the storage system for the proposed RES

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