A study on Towering Performance effectiveness by enhancing Power Factor PV Grid System

V.Sekar, V.Thiyagarajan, B. Revathi

Dhanalakshmi Srinivasan College, Tamil Nadu, India

Abstract - The analyzes and compares the performance of a new inverter topology with two types of enter sources: Solar PV source and Ideal dc supply (battery). It is proven that when the solar panel is connected, spikes are got in output voltage waveforms. These spikes are eradicated by way of inserting a capacitor. The capacitor is chosen for a specific electricity thing which is most useful with appreciate to cost, measurement and energy quality. Total Harmonic Distortion, Active Power, Reactive Power, RMS Voltage and RMS Current are measured for one-of-a-kind load energy factor. Finally these consequences are compared with these received using battery with same input voltage magnitude. This Paper shows that for Solar Panel Circuit, THD, P and Q are less for 0.8 and above energy factor, however below 0.8 PF, the THD, energetic and reactive electricity switch are more. This capability that the overall performance of Solar Panel in the proposed circuit topology is seen to be better as compared to the same circuit with battery inside a range of strength factor.
Keywords - Solar PV, THD, RMS, Power Factor.

I. INTRODUCTION

Electricity Recently, renewable electricity resources are turning into popular due to the depletion Of conventional fuel sources and their poor affects on the environment. Solar energy Is one of these choice renewable power resources. It is transformed to the electrical strength By photovoltaic (PV) arrays. PV arrays do no longer generate any toxic or hazardous substances that pollute the surroundings and have long life. Another full-size characteristic of them is the requirement of low maintenance. Due to the development in picture voltaic technologies, the effectivity of the PV arrays has been improved. Therefore, research on PV structures have multiplied gradually. Multilevel inverters have acquired increasing activity for electricity conversion in highpower purposes due to their lower harmonics, greater efficiency and decrease voltage stress in contrast to two-level inverters. Multilevel inverters generate a staircase waveform. By increasing the wide variety of stages in the output voltage, the harmonic content material and consequently THD are reduced. Therefore, they produce excessive quality output voltage through increasing the level number. The stage range can be without difficulty increased. As a result, voltage stress is reduced and the output voltage wave structure go closure to the sinusoidal shape. In this study, a single phase multilevel inverter gadget is proposed. The principle of the proposed approach will be explained for a 15-level inverter. However, the shape can be without problems tailored to any number of levels.

II. LITERATURE REVIEW

It has assembled to summarize statistics of applicable on energy Improvement technique for renewable strength system. Furthermore, this chapter are also discussing about a find out about

on the previous lookup based on journals and conferences. The Information that studied at some stage in research will be recorded and discussed in the following subchapters. The sources of the literature reviewed are journals, conferences and books.

III. CASE STUDY

There are numerous journal have been analysed which are Power Factor Improvement using Fuzzy Logic Control of an AC Synchronous Motor by using Audley D. Grey, Improvement of Power Factor Voltage for Renewable Energy Systems the use of PLC`s New Fuzzy Module through Li Wang and Kuo- Hua Liu, A Fuzzy Logic Controller based totally on Power Factor Correction for LED Lighting Application via Hariprasath S and Dr Balamurugen R, Grid Connected PV`s nd Wind Turbine with a Wide Range of Reactive Power Control and Active Filter Capability through E.K Hussain and Electrical Energy Conservation in Automatic Power Factor Correction And Embedded System by means of M. Ravindran and V. Kirubakaren. This lookup is to formulate a paradigm that will use Fuzzy Logic as a tool to manage Synchronous moor that will song and correct Power Factor of a plant. in the United States, Power Factor correction is commonly performed at the neighborhood (equipment) stage or through the use of a massive capacitor bank, but this work will tackle the answer the usage of and as it should be sized AC synchronous motor to match the plant in question. Many plant use synchronous motors in distinctive areas of operation, hence putting off the value of purchasing more hardware. The synchronous motor will supply a clean transient and more particular correctional cost compared to capacitor financial institution when correcting the energy factor.

IV. RESEARCH METHODOLOGY

The proposed multi-level inverter machine consists of Level Module, H-Bridge inverter, Solar PV Module as dc voltage supply and RL load [1]. The proposed circuit with solar panel as source for two stage modules The level of output voltage shape depends on the stage module used in the circuit. This provides a two-stage, single-phase electricity converter machine fed from PV and wind Turbine Energy sources, and a new manage methodology for transferring the output energy to the grid, leading to decrease the harmonics in the grid current and controlled power   factor.
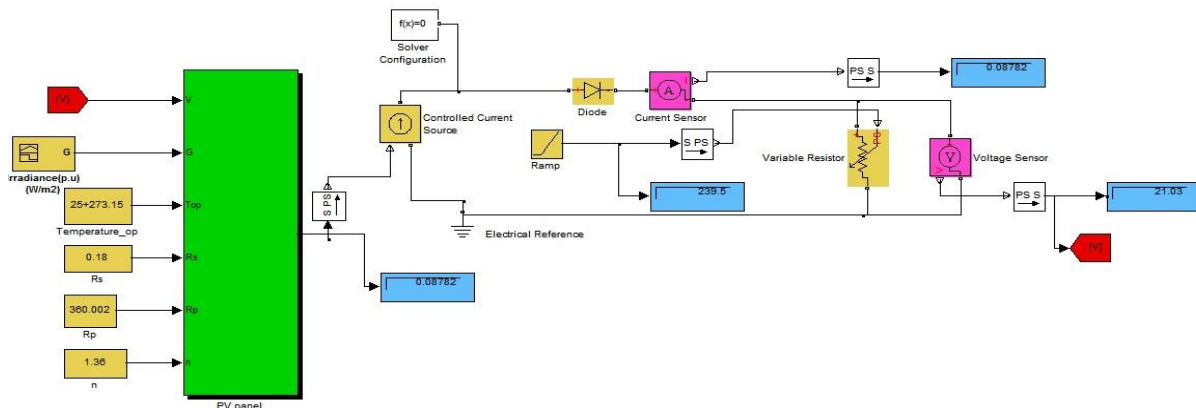

Fig. 1 PV Array Model Used in the Ciruit

The purposed manipulate depends on evaluating the complete power from the renewable electricity sources with the energy required to provide the non linear load, leading to a controlled distribution of electricity requirement from the sources. Key result of the paper is that magnificent electricity element and exact harmonics reduction is obtained from the perspective

of the grid, with no requirement for an intermediate battery due to inherent ability to provide main reactive power to the grid when necessary. Simulation and experimental consequences are used to guide the purposed manage methodology.

In order to analyze the efficiency of our microcontroller based totally monitoring system, we applied three a number of kinds of load at the output of the distribution transformer and transformers working parameters were calculated. Then the acquired parameters were analyzed with the transformers rated values. This presents a novel manipulate scheme using an industrial programming good judgment controller (PLC) withn a new fuzzy module to decorate power factor and voltage of a hybrid wind/PV energy era system. The purposed scheme can mechanically alter each electricity issue and voltage of a wind induction generator under more than a few wind speeds. From the experimental results, it indicates that the purposed manage scheme can correctly provide higher energy element and voltage profile for the studied renewable energy system. In electricity generation, an electric generator is a device that converts mechanical energy to electrical energy. A generator forces electric powered present day to glide through an exterior circuit. The source of mechanical electricity may additionally be a reciprocating or turbine steam engine, water falling through a turbine or waterwheel, an interior combustion engine, a wind turbine, a hand crank, compressed air, or any different supply of mechanical energy. Generators furnish almost all of the energy for electric powered power grids. Generators are generally operated in the overexcited mode because the turbines are the predominant source of reactive electricity for inductive load throughout the machine. The enhancement of energy manufacturing unit can be finished through controlling the generator excitation system. Nowadays, due to the fact of simplicity, robustness, and reliability, fuzzy logic is used in almost all fields of science and technology, together with solving a extensive range of control troubles in strength system manage and operation. Unlike the common control theorems, which are really based on linearized mathematical models of the controlled systems, the fuzzy manage approach tries to set up the controller at once based totally on measurements, lengthy term experiences, and expertise of domain experts/operators . In sum, this mission is to improve PF by way of imposing the approach of excitation of an RES synchronous generator to furnish the reactive strength through making use of Fuzzy Logic as a tool Mto control the cause system.

CONCLUSIONS

In this paper, THD in load voltage, Active Power and Reactive Power are Evaluated for a proposed inverter circuit with Solar Panel as a dc Source and also battery Using SIMULINK / MATLAB software. The performances are compared for specific Power component masses keeping the dc enter voltage equal besides using the filter. In both cases, THD existing in load voltage might also always be reduced below 5% by using the use of filter. The THD received from proposed inverter scheme is comparable to THD got from traditional inverter scheme but the no. of switches required is much less in the proposed scheme. The standard commentary is that in the range of pf from 0.8 to 0.85 the performance of PV panel connected inverter is highest quality to that with pure dc (battery) as enter source.

REFERENCES

[1] Beser, Ersoy, et al. "A grid-connected photovoltaic power conversion system with single-phase multilevel inverter." Solar Energy 84.12 (2010): 2056-2067.

[2] Beser, Ersoy, et al. "Design and application of a single phase multilevel inverter suitable for using as a voltage harmonic source." Journal of Power Electronics 10.2 (2010): 138-145.

[3] Beser, E., et al. "Design and application of a novel structure and topology for multilevel inverter." Power Electronics, Electrical Drives, Automation and Motion, 2008. SPEEDAM 2008. International Symposium on. IEEE, 2008.

[4] Ahmad, Mohammad, and B. H. Khan. "New approaches for harmonics reduction in solar inverters." Engineering and Systems (SCES), 2012 Students Conference on. IEEE, 2012.

[5] Altas, I. H., and A. M. Sharaf. "A photovoltaic array simulation model for matlab-simulink GUI environment." Clean Electrical Power, 2007. ICCEP'07. International Conference on. IEEE, 2007.

[6] Hsu, Yuan-Yin, and Chao-Rong Chen. "Tuning of power system stabilizers using an artificial neural network." IEEE transactions on energy conversion 6.4 (1991): 612-619.

[7] Park, Young-Moon, Myeon-Song Choi, and Kwang Y. Lee. "A neural network-based power system stabilizer using power flow characteristics." IEEE Transactions on energy conversion11.2 (1996): 435-441.

[8] Park, Young-Moon, Myeon-Song Choi, and Kwang Y. Lee. "An optimal tracking neuro-controller for nonlinear dynamic systems." IEEE Transactions on Neural Networks 7.5 (1996): 1099-1110.

[9] Liu, Wenxin, Ganesh K. Venayagamoorthy, and Donald C. Wunsch II. "Design of an adaptive neural network based power system stabilizer." Neural networks 16.5-6 (2003): 891-898.