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ANALYSIS OF AN H6 INVERTER FOR TRANSFORMERLESS THREE-PHASE PV SYSTEMS

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ABSTRACT

—Eliminating the leakage current is one of the most important issues for transformerless three phase photovoltaic (PV) systems. In this paper, the leakage current elimination of a three-phase four-leg PV inverter is investigated. With the common mode loop model established, the generation mechanism of the leakage current is clearly identified. Different typical carrier-based modulation methods and their corresponding common mode voltages are discussed. A new modulation strategy with Boolean logic function is proposed to achieve the constantcommon mode voltagefor the leakage current reduction.Finally the differentmodulation methods areimplemented and testedonthe TMS320F28335DSP +XC3S400FPGAdigital control platform. The experimental results.The transformer less inverter topologies Solar cells produce direct current electricity from sun light which can be used to power equipment or to recharge a battery. The first practical application of photovoltaic was to power orbiting satellites and other spacecraft, but todaythe majority of photovoltaic modules are used for grid connected power generation. In this case an inverter is required to convert the DC to AC. There is a smaller market for off-grid power for remote have superior efficiency thanks to saving transformer but there semiconductor devices still hardswitching stated present .A family of ZCT transformer less inverterwithsinusoidal PWM modulation is deduced by using fuzzy logic controller

1. INTRODUCTION

Now days the distributed PV generation system has received a better applications in the industrial and commercial. Comparing other configurations, transformer less type has become more popular. Supported these deserves, some researchers shall pursue high power density transformerless PV gridconnected inverters by raising the switch frequency. Wanting back, this developing trend can match the developed route of DC switch provides in 3C (Computer, Communication and client Electronic) business, for his or herswitch frequencies have already reached megacycle per second level presently. High frequency transformer less PV grid-connected inverters may affect from high losses, cooling stresses, and EMI noises. Obviously, soft-switching technique is one in all the foremost excellent techniques to scale back or perhaps take away the switch losses, and to degrade the switch stresses, like di/dt and dv/dt.Typically, existed soft switch techniques may be roughlycategorized into 2 sorts: the snubber-type along with the resonant tanks and also the control-type mistreatment switch madulation methods. In past literature, there have been a lots of snubber-type soft switch topologies obtained from Si Controlled Rectifier (SCR) commutating branches. The main thing was at joining desired options from each PWM and resonant converters whereas ignoring their individual disadvantage. Notably, in keeping with or while not active power devices, the snubber-type soft switch techniques may be more classified because the active snubber-type and passive snubbertype. In active-snubber-types, the resonanttanks willsolely be engaged

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throughout switch conditions of high-frequency switches.

PV systems are used to supply The Generated electrical energy into grid .Renewable energy sources are key issues in the attemptto address energy problems among the all energy sources. Solar energy one of the most up to date techniques .however applications are limited by relatively high cost in comparison with traditional sources.today‟s word needs more energy due to skyrocketing population industries .hence renewable energy plays an important role to ensure a better future .solar energy has greatest role in present tend because free from pollution. and green. pv grid systems are two types they are usually embedded with low -or high efficiency transformer nevertheless the transformer requires few number of power stages .and thus , the design of highly efficientand low cost and small-size inverters .become difficult task .on other hand it is possible to remove transformer from the inverter in order to reduce the losses ,size and cost of those systems, namely transformer less pv systems . All the transformer less pv systems are designed based on the condition when CMV is constant. Throughout the different switching states. In transformer less pvinverters, the main design criterion is to reduce the leakage current. Flowing through capacitance through the ground. In recent years, grid connected systems have become more and more wide spread in private and commercial application.Non isolated inverters with decreased no of components .High efficiency are preferred choices for these applications where,power density, cost,weight and reliability are critical issue.Its efficiency can reach 97% with unipolar pulse width modulation method. However generates a common mode voltage with amplitude of half input voltage. At the switching frequency at the silicon gallium n types.

2. EXISTING SYSTEM

The distributed electrical device systems, that were the updated version of the recent isolated electrical device setup, were in operation supported the principle of the exhausting shift Technique. Within the existing system it absolutely was changed with the implementation of a electrical device less system setup, however the exhausting shift methodology was maintained.

Transformerless photovoltaic (PV)inverters have been receiving more and more attention due to small size, low cost and high efficiency. But the leakage current arises due to lack of galvanic isolation. The leakage current isprone to result in the electromagnetic interferences and potential safety problems. Therefore, the leakage current should be limited below the VDE 0126-01-01standard of 30 mA[1].

3. PROPOSED SYSTEM

A Loss-Free switch (LFS) thought supported the H6-I topology is planned, that is engaging in high power density electrical device less PV grid connected inverters. A resonance mechanical phenomenon with the self-compensation mode is meant, and one or two of the resonant tanks with the selfcompensation mode area unit obtained supported the H6-I. They are ready to atone for the loss of the resonant tanks exactly. The ZCS conditions area unit obtained for all power switches in each of activates and switch off processes below unity power issue condition. On the other hand, the ZCS put off of the freewheeling diodes is achieved naturally in order that the reverserecovery downside is eased. By integration the resonant tank and clamping diodes with saving one diode, the freewheeling clamping operate is achieved synchronously in order that a continuing common-mode voltage is completed at switch frequency scale. And conjointly with the employment of SEPIC circuit during this system that acts as each a Buck-Boost convertor & associate LC filter, we are

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able to bring home the bacon a better offervoltage rating and can also eliminate the results of harmonics and distortions thanks to voltagenoises, fall, busybodied signals, etc.

4. BLOCK DIAGRAM

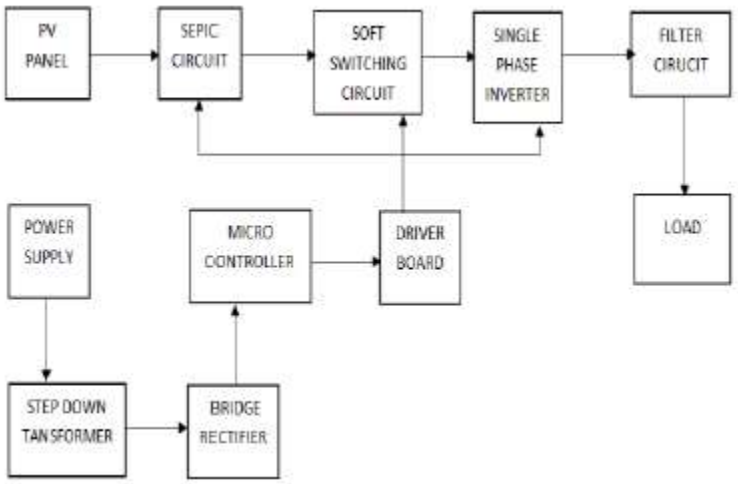

Fig.1. Working block diagram.

WORKING

In this system, the voltage supply is to be obtained as a DC power provide through the alternative energy via the associated PV panel. The panel provides associate degree unregulated provide of power, therefore we've got instilled a SEPIC circuit (Buck-Boost Converter) for the boosting ofvoltage levels. The SEPIC circuit consists of associate degree integrated LC filter that helps in eliminating any unwanted distortions or harmonics (like noise signals) within the frequency level. Therefore it provides a clean, artless, high level voltage provide that is being fed to the soft switchcircuit connected to the H6-inverter unit. Here, the first objective of the switch circuit is to producea switch transient (Turn- On & Turn-Off) beneath the zero current state i.e. all the IGBT power switches are either turned ON or OFF beneath the zero current unity power issue condition.

Therefore it eliminates the likelihood of losses occurring because of electrical phenomenon noises.

ADVANTAGES

- Uses renewable energy.
- Cheaper than the traditional technique.
- Simpler module.
- No electrical charges in terms of value.
- Eco-friendly instrumentality.
- The reverse recovery current of freewheeling clamping diodes is less severity, whichminimizes the reverse recovery loss and therefore the EMI noise.
- The ZCS close up of the freewheeling diodes is obtained effectively.
- Using SEPIC circuit, we are able to management the frequency pulse by providing a variable delay time within the

controller unit.

5. APPLICATIONS

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- High frequency electrical device less PV inverters.
- Unity power issue application.
- Grid systems and Power generation units.

CONCLUSION

The H6-I electrical converter is used employing a SEPIC circuit and powered by alternative energy. This eco-friendly initiative may be used for native inverters and motor applications. The projectedmodel is enforced victimization applicable hardware mentioned within the text and also the results obtained area unit satisfactory. The frequency variations achieved victimization our model is of the order of 50-60Hz. The DC power supply to the SEPIC circuit may be a photovoltaic cell (PV) panel. The model may be changedconsistent with specific necessities by ever-changing the delay amount within the PIC microcontroller to realize larger degree of frequency variations.

A reasonable voltage level and frequency vary may be achieved victimization our projected model. though the model works well normally purpose applications, a additional versatile version could also be developed for giant scale applications. standard isolated electrical device less systems usesthe exhausting shift technique, and doesn'tincorporate any type of a microcontroller unit. The Loss-Free shift (LFS) technique based mostly} electrical device less PV-H6 electrical converterhas several benefits than Cheaper than the traditional technique, less complicated module, No electrical charges in terms of value, Eco-friendly instrumentation, pollution free module.

Further, the model may be created a intelligent system by incorporating IOT functionalities and a furthercharge storage unit.

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