



SURVEY ON REALIZATION OF THREE PHASE TWO STAGE GRID SYSTEM BY USING LLC RESONANT CONVERTER

¹Wasim Akram,, ² Dr. Prabodh Kumar Khampariya

¹M.Tech Scholar, Department of Electrical Engineering, Sri Satya Sai University of Technology & Medical Science, Sehore, Bhopal

²Asso. Professor, Department of Electrical Engineering, Sri Satya Sai University of Technology & Medical Science, Sehore, Bhopal

Email: 1gauravshirore@gmail.com, 2khampariya5@gmail.com

Abstract

This paper presents the micro inverter concept incorporated in large size photovoltaic (PV) installations such as megawatts (MW)-class solar farms where a three-phase ac connection is employed. The first stage mainly considered for a high efficiency full-bridge LLC resonant dc–dc converter which interfaces to the PV panel and produces a dc link voltage. A center point’s iteration algorithm developed specifically for LLC resonant topologies is used to track the maximum power point by the PV panel. The second stage is comprised of a three-phase dc–ac inverter circuit which employs a simple soft-switching scheme without adding auxiliary components.

Keywords: Center points iteration (CPI), maximum power point tracking (MPPT), module integrated converter (MIC), three phase two stage converter.

I INTRODUCTION

The energy which is harvested from the herbal assets like sunlight, wind, tides, geothermal warmth and many others is referred to as Renewable energy. As those sources can be obviously replenished, for all realistic purposes, these may be considered to be infinite in contrast to the tapering conventional fossil fuels. The global strength crunch has furnished a renewed impulsion to the growth and development of clean and Renewable strength sources. Clean development Mechanisms (CDMs) are being followed by groups all throughout the globe. Every other gain of making use of renewable resources over conventional strategies is the huge discount in

the level of pollution related. The value of traditional energy is growing and solar energy has emerged to be a promising alternative. They are abundant, away from pollution, allotted for the duration of the earth and recyclable. PV arrays encompass parallel and series connection of PV cells which might be used to generate electrical power depending upon the atmospheric specifics (e.g. sun insolation and heat). [1].

1.1 Historical Development:

Photovoltaic generation in fact goes returned over 160 years. The basic technological know-how was first got here upon in 1839 but the pace of advancement genuinely hastened in two primary drives within the 20th century. Bell Laboratories, determined silicon had photoelectric attributes and quick evolved Si sun cells, achieving 6% performance and former satellites have been the fundamental use for those first solar

1.2 Application:

Sun technology are broadly certified as either passive or lively relying at the manner they catch, trade over and distribute sunlight. Active solar proficiencies use photovoltaic arrays, pumps, and fanatics to transform daylight into executable outputs. Passive sun techniques encompass selecting materials with favorable thermal attributes, and bringing up the location of a constructing to the solar. The standalone PV structures had been used for solar road lighting, home lights device, SPV water pumping gadget. A hybrid machine established with a backup system of diesel generator may be utilized in far off army installations, health centers and tourist bungalows. In grid related system the essential part of the burden for the

duration of the day is supplied with the aid of the PV array after which from the grid while the daylight isn't sufficient.

1.3 Objectives:

1. A high-performance 3-phase MIC with two-stage zero voltage switching (ZVS) operation for the grid-tied PV gadget is proposed on the way to reduce cost in keeping with watt, enhance reliability, and increase scalability of MW-magnificence solar farms through the development of new solar farm device architectures.

2. The primary degree consists of a excessive-efficiency full-bridge LLC resonant dc-dc converter which interfaces to the PV panel and produces a dc-link voltage.

3. The second one stage is made from a 3 phase dc-dc inverter circuit which employs a simple soft-switching scheme without adding auxiliary additives. The modeling and control approach of this 3-phase dc-ac inverter is described

1.5 Motivation:

Conventionally, the increase DC-DC converter is used for boosting the PV voltage to the better degree and also for tracking the most point of the PV output strength in actual time. Considering the fact that switching of semiconductor gadgets happens at excessive currents, performance of these converters is low at high frequencies because of the tough switching. In the different hand, at low frequencies the scale and price of the magnetic components and capacitor might be high. Furthermore, the parasitic capacitance of the PV panels to floor could purpose leakage currents due to lack of isolation.

II Literature Survey

Lin Chen, Member, IEEE, Ahmadreza Amirahmadi, scholar Member, IEEE, Qian Zhang, student Member, IEEE, NasserKutkut, Senior Member, IEEE, and IssaBatarseh, Fellow, IEEE have presented of their paper titled "Design and Implementation of Three-Phase Two-Stage Grid-Connected Module Integrated Converter" Resonant converters had been confined inside the final thirty years to niche programs including very high-voltage programs or excessive fidelity audio systems while an awful lot attempt become spent in research by way of industries and universities because of its appealing capabilities: smooth waveforms, excessive efficiency and high power density. These days the LLC resonant Converter particularly in its half of-bridge

implementation, has been extensively and efficiently applied to flat panel TV 80+ ATX and small form component computer, where the requirements on efficiency, energy density and EMC compliance of their switching mode power supplies (SMPS) are getting an increasing number of stringent. But future SMPS necessities will need to face one of the few last drawbacks of LLC resonant converter topology this is related to the output clear out capacitors extent that represents the main limit for such programs. The injection of rectified sine wave currents into the output filter out capacitor may be thoroughly mitigated with the aid of the parallel use of more than one modules including in interleaved buck solutions for voltage regulator modules. This topology has been supplied in for two modules working with 90 stages phase shift. One of the drawbacks of this answer is represented by means of the inherent modern-day unbalance because of resonant element mismatch that may reason one of the two modules to reduce its output energy all the way down to zero, hence requiring obligatory paintings a rounds to overcome the trouble Resonant converters are normally decided on for applications which demand for a high strength density and a high electricity performance. With the aid of presenting tender-switching, the switching frequency can in fashionable be chosen much higher than the switching frequency of a similar tough-switching converter. As a result, the volume required for the passive components is extensively reduced, allowing high strength densities and excessive power conversion efficiencies. on this paper, a tremendously efficient battery charger is designed, which is able to directionally charging mild electric motors (LEVs). The charger may be linked to a dc micro-grid at $V_{dc} = 450V$ and will characteristic an output voltage variety from 17V to 56V. To restriction the duty-cycle and/or frequency variant, and to offer galvanic separation from the dc-bus, a transformer is needed. For this form of software, the LLC resonant converter promises great unidirectional performance. In, a bidirectional LLC prototype became constructed, however no optimized modulation schemes have been hired and the converter did now not achieve first-rate power conversion efficiency. In a symmetric fourth-order resonant converter became constructed based on an LLC resonant tank, offering a

further resonant capacitor. However, the proposed CLLC converter operates in enhance-mode in each guidelines and is therefore now not very appropriate for use as a voltage-regulating converter. The LLC resonant converter has drawn plenty of attention because of its advantages over the traditional series resonant converter and parallel resonant converter: narrow frequency version over wide load and enter variant and 0 Voltage Switching (ZVS) of the switches for entire load range. This paper presents an analysis and reviews practical design concerns for the LLC-type resonant converter. It consists of designing the transformer and selecting the components. The step-by way of-step design manner defined with a layout instance will help engineer's layout the LLC resonant converter without problems. The effect of resonant aspect mismatch can also be explored and a suitable megastar connection solution will be investigated to conquer modern score limits with the aid of intrinsic balancing. [2]

III SYSTEM ANALYSIS AND DESIGN

3.1 Architecture of Two-Stage Three-Phase grid-Tie Inverter System:

On the way to provide galvanic isolation, various isolated converters for excessive step up programs were proposed. In standard, the topologies with galvanic isolation suitable for this software can be categorized into corporations: single - switch topologies and multi switch topologies. Recently, the LLC resonant topology has emerged as attractive due to its desirable consisting of excessive efficiency and natural zero voltage switching (ZVS)/zero current switching (ZCS) commutation. Consequently, a full-bridge LLC resonant converter is hired in the first stage to attain high performance and track the maximum power point of each PV panel.

For the three- phase dc/ac converter within the second stage, a variety of active soft-switching topologies have been proposed in closing three decades. Maximum of them may be divided into 3 groups: auxiliary resonant commutated pole (ARCP) group, resonant dc-link inverter (RDCLI) group, and resonant ac-link converter (RACLC). The ARCP can be implemented broadly for the voltage-source kind unmarried-section or 3-phase inverters however it calls for a massive wide variety of auxiliary components. Compared to the ARCP, the RDCLI has the

benefits of fewer auxiliary switches and a less difficult circuit. Several smooth-switching topologies are proposed to gain the minimal range of more additives. But, the driving alerts of the auxiliary switches are very sensitive to the noise from the principle circuit. For the reason that RACLC can attain voltage boosting and electric isolation at the equal time, its miles extraordinarily favored for renewable energy strength era. Regrettably, the control circuit for the RACLC is complex and bidirectional switches are required. In reality, auxiliary components are unavoidable for all of the tender switching topologies cited in advance.

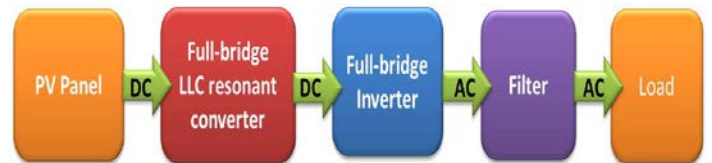


Figure .1 PV Panel with Load

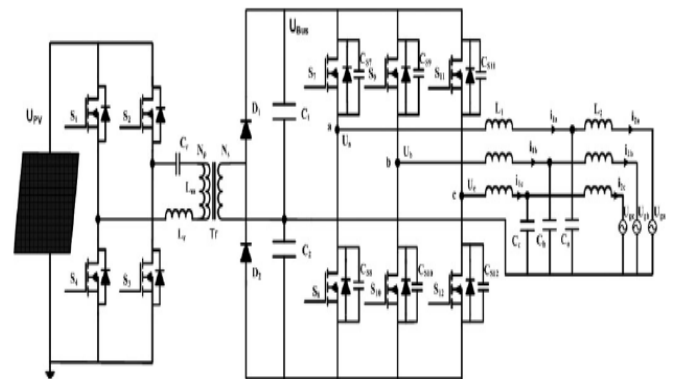


Figure 2: Two-stage three-phase four-wire grid-tie inverter system.

3.2 LLC Resonant Converter

Now a day's particularly competitive commercial environment fashion designer usually try for highly efficient, reliable, and surprisingly compact layout. DC-DC converter generation has evolved from earlier linear power converters to superior resonant converters. Issues including excessive switching losses and incapacity to function at high frequencies, associated with the PWM converters can effortlessly be triumph over by the use of resonant converters. For frontend DC-DC utility LLC is the first-class suitable topology as compare with the other resonant converter .hassle associated, with the series resonant converter which include incapability to alter the output voltage at no-load circumstance and that with the Parallel resonant converter

together with presence of excessive circulating electricity can effortlessly be conquer through LLC resonant converter.

IV CONCLUSIONS

This paper has presented a utility of a full bridge LLC resonant converter in a three phase grid related photovoltaic (PV) system. The LLC has the advantage of zero voltage switching, which results in a higher performance in contrast to conventional increase converters. Due to its operation at high frequencies, using smaller and cost effective magnetic additives is possible. Moreover, DC-link capacitor for the inverter will be chosen smaller way to the excessive switching frequency and speedy dynamic response of the converter. The inverter controller consists of the outer loop to maintain the DC bus voltage steady, and the internal loop to synchronize the output voltage of the inverter with the grid voltage and also keep the output current in phase with voltage. The simulation effects showed the effectiveness of the system to provide and make sure appropriate strength and unity power factor the grid, as well as DC-link voltage stability. The capacity of the DC-DC converter to extract most energy from the sun arrays underneath fast changing irradiance, has also tested. In an effort to construct a PV grid linked device, a number of parameters need to be contemplating and to be optimized in order to attain most power technology.

V. REFERENCES

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