Battery charging with solar power in single conversion stage by using High voltage gain boost converter

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ABSTRACT

A single stage high-voltage gain boost converter based on the three-state commutation cell uses for battery charging using PV systems and a reduced number of conversion stages of converters. The presented converter operates in zero-voltage switching (ZVS) mode for all switches. By using the new concept of single-stage conversation, the converter can generate a dc bus with a battery bank or photovoltaic panels, allowing the simultaneous charging and discharging of the batteries according to the radiation level of sun.

Keyword : - *Battery, dc–dc converter, photovoltaic panels, inductors.*

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1 1. INTRODUCTION

Increasing of alternative energy sources, such as photovoltaic panels, wind energy conversion systems and fuel cells, brings new challenges for the power electronic society and industry. Now a day, there is a demand of power supply. To meet the increased demand, the power generation from renewable increases day by day. Most of renewable energy in the form of dc volts. To integrate this generated power from renewable to grid, it requires a cheap, robust, efficient converter i.e. an DC to DC converter & DC to AC converter Then the optimization of the efficiency, volume, weight, and cost of power converters will be key features regarding the viability of these technologies, The output power of the solar cell can be changed easily by the surrounding conditions, such as irradiation and temperature. To transmit the power from the PV array to the load with higher efficiency, the coupled conductor interleaved boost converter is introduced. The presented converter can minimize switching losses, and ripples reducing. One of the major concerns is the need of high output dc voltage bus

The increasing use of renewable energy in applications regarding distributed systems such as PV system, fuel cells, and wind energy etc. In, one of the major concerns is the need of a high output dc-voltage bus to supply inverters, UPS, etc., from low input voltage levels. This issue has lead to the conception new several converters. In non isolated dc–dc converters with high voltage gain have been highlighted in different applications.

2. 1 Literature review

2.1 As per Ke Zou, --in this paper introduced for high-power applications by using several modular converter topologies. based on a switched-capacitor-cell concept. Full cell and the half-cell Two types of switched-capacitor cells are discussed. For dc–ac inversion full cell can be used, and the half-cell is utilized in both dc–dc and dc–ac applications. To eliminate the large output capacitor that exists in many traditional switched-capacitor topologies the rotational charging method is adopted for the half-cell-based dc–dc voltage multiplier. A soft-switching scheme, which does not require extra components, Authors reduce the switching loss and electromagnetic interference. A variable switching frequency control scheme is proposed to realize soft switching for dc–ac inverters. [1].

2.2 As per Y. Bo, L. Wuhua, W. Jiande, --represented A grid-connected photovoltaic (PV) power system with the high step-up ZVT interleaved boost converter is presented in this paper. For a typical PV module, the output voltage is relatively low. So the high voltage gain is obligatory to realize the grid-connected function. The proposed PV system employs a ZVT interleaved boost converter with an active-clamp circuit as the first power processing stage, which can boost a low voltage of PV array up to the high DC bus. And a full bridge inverter with bidirectional power flow is used as the second power processing stage, which can stabilize the DC bus voltage and shape the output current. Two compensation units are added to perform in system control loops and low THD of the current is achieved. In addition a simple sensor-less MPPT method is applied in the PV system and represents a good performance [2]

2.3 As per K. C. Tseng and T. J. Liang,-- "Novel high-efficiency step-up converter," *IEE Proc. Elect. Power Appl.*, vol. 151, no. 2, pp. 182–190, Mar. 2004. In this novel by using the capacitor charged in parallel and discharged in series by the coupled-inductor, high step-up voltage gain and efficiency are achieved with an appropriate duty ratio.[3]

2.4 As per M. A. G. de Brito, L. P. Sampaio, L. G. Junior, R. B. Godoy, and C. A. Canesin, **--** This paper presents new inverter topologies based on the integration of a DC to DC Zeta or Cuk converter with a voltage source inverter (VSI). The proposed integration procedure aims to reduce the amount of components, meaning lower volume, weight and costs. In this context, new families of single-phase and three-phase integrated inverters are also presented. Therefore, considering the novelty for Zeta and Cuk integrated inverters structures, the proposed single-phase and three-phase inverters versions are analyzed for gridtied and stand-alone applications. [4]

2. 2 LITERATURE REVIEW OBSERVATION

As solar is enhancing its empire in practice, the various work is going on at various factors and conditions. Dc-dc converter is one of the most proposed and suitable technique in the area of extracting more output from solar to gives to the battery charging with high step-up voltage gain and efficiency are achieved . So, it is very essential to work techniques and bring high efficiency.

3. PROPOSED METHODOLOGY

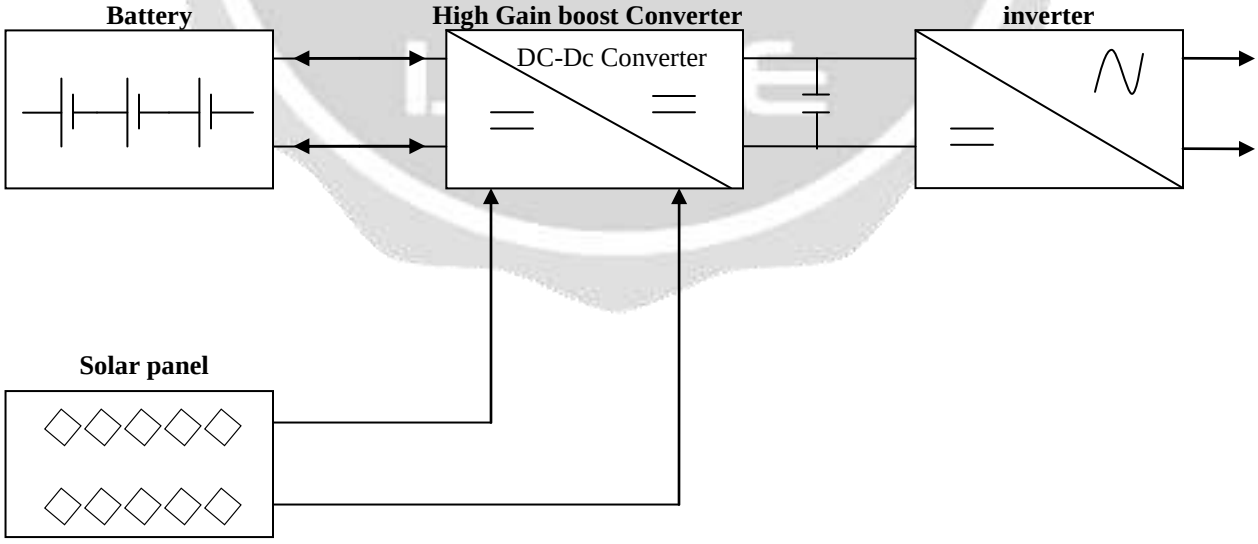

Fig. No. 1

Here presented some design rules useful for developing high efficiency switched-capacitor converters. In that presented several modular converter connections based on a switched-capacitors, a soft-switched technique was used in order to reduce the EMI (electromagnetic interference) and switching loss. The high step up dc–dc

converters based on coupled inductors and multiplier cells are presented and the major challenges. Some employ couple inductors was used reduce the voltage stress across the converter switches. A voltage doubler rectifier as the output stage of an interleaved boost converter with coupled inductors was present.

The obtained voltage gain is twice that of traditional boost converters due to the doubler stage, as coupled inductors provide additional voltage gain, although voltage stress across the switches is not increased. Described a cascade high step-up dc–dc converter based on quadratic boost converter with coupled inductor in the second boost converter. A study of a topology based on two for-switch bridges around a *LC* circuit that does not utilize iron core transformers applied in megawatt level power transfers

the proposed topology which is formed by four controlled power switches S1–S4, two rectifier diodes D1 and D2, two transformers T1 (windings T1a and T1b) and T2 (windings T2a, T2b, T2c, and T2d) and four output capacitors C1–C4. one input inductor, additional components are included, current sharing is maintained between (S1, S2, T1a, T2a) and(S3, S4, T1b, T2c). so another side reduced current stress through the components, the instantaneous current during the turn OFF of the switches is significantly reduced for $D>50\%$,thus leading to minimized switching losses. So leading to minimized switching losses. And also the transformer is designed for about only 70% of the total output power. And there is no energy transfer from the input to the output during the second and fifth stages only. the circuit diagram fig 4

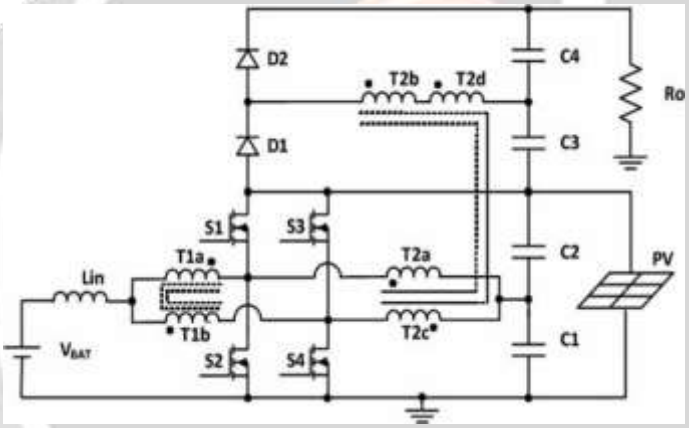

Fig. no. 2

4. CONCLUSIONS

The main advantage of the topology is the wide voltage step-up ratio with reduced voltage stress across the main switches, what is important in stand alone or in grid-connected systems based on battery storage, such as renewable energy systems. PV applications further optimization can be investigated in order to reduce conduction losses and improve efficiency in the rated condition.

5. REFERENCES

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