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High gain interleaved KY converter with coupled inductor and non isolated output voltage

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Abstract:
A novel high step up converter which uses a structure of KY converter, a conventional synchronously rectified (SR) support converter, and a coupled inductor with turns proportion, is exhibited in this examination. In this converter, these two consolidated converters utilize the same switches. Likewise, since the proposed converter has a yield inductor, the yield current is non-throbbing due to synchronous rectification. In addition, the comparing voltage pick up is more prominent than those of the conventional lift converter and the current converters with yield inductors. Moreover, some portion of the spillage inductance vitality can be reused to the yield capacitor of the SR support converter. In this way such a converter is extremely appropriate for low-swell applications. Likewise, this converter is driven utilizing just a single half-connect door driver. At last, scientific conclusions and a trial setup with 12 V input voltage, 72 V yield voltage and 60 W yield control are utilized to confirm the viability of the proposed converter by simulation using MATLAB/Simulink software.
Keywords: *KY converter, Inter-leaved step up converter, coupled inductor, synchronous rectifier.*

I. Introduction

Lately, sustainable power source frameworks are winding up plainly more furthermore, more imperative, for example, a sun oriented cell framework, power device framework et cetera. These frameworks exchange the spotless vitality into power. Moreover, thermoelectric era framework is another sustainable power source framework, which can change over warmth vitality into power to supply the battery. As by and large perceived, the yield voltage of the thermoelectric generator is extremely delicate to temperature varieties, and subsequently is very insecure. In this manner, a high voltage-boosting converter, which ventures up the low yield voltage of this sustainable power source framework to a high voltage, assumes an essential part in this application [1, 2]. As a rule, the conventional lift converter [3] is typically utilized, in light of the fact that of its low parts, basic structure and minimal effort. Be that as it may, the voltage worry of the conventional lift converter is equivalent to its yield voltage. Clearly the switch would obstruct a high voltage when the obligation cycle is expanded to accomplish a generally high-yield voltage. As an outcome, a switch with a high on-resistance is required, and this outcomes in extreme conduction misfortunes. In light of the previously mentioned, so as to beat the characteristic issue of the

conventional lift converter, numerous sorts of voltage-boosting methods have been introduced. Along these lines, so as to get a higher yield voltage, numerous non-detached venture up converters utilizing diverse voltage-boosting systems have been displayed. These voltage-boosting systems incorporate coupled inductor [4], exchanged capacitor, fell structure [9], assistant transformer et cetera. In [4], with a specific end goal to accomplish a high voltage pick up, a coupled inductor joined with four diode-capacitor cells of is utilized, and in light of the fact that of the spillage inductance of the coupled inductor, there are no present worries through the transistor and diodes. In any case, the yield current is throbbing, and the yield terminal has two capacitors associated in arrangement, which makes the outline more confounded. In [5], a non-secluded venture up converter got from the ordinary flyback converter is produced to accomplish a high voltage pick up, and besides, the spillage vitality of the coupled inductor can be reused to the yield stack. Notwithstanding, the voltage pick up is just marginally higher than that of the customary flyback converter, the voltage spike on the fundamental switch due to the diode's turn-on delay is high, and the present spike on the essential side of the coupled inductor on account of the diode's turn around recuperation current and the coupled inductor's parasitic capacitors is additionally high. In [7], the converters in light of exchanged capacitors and coupled inductors are introduced. Despite the fact that the converter can accomplish high-yield voltages, the yield streams are throbbing and the converter in [6] needs an additional snubber to reuse the spillage inductance vitality, which makes the converter convoluted. In [8], cascaded H bridge inverter fed hybrid system for increasing the efficiency and improve the gain of the converter fed renewable energy system. The converter can reuse the spillage inductance vitality without additional active brace. Be that as it may, the yield voltage is reversing, and yield current is throbbing. In [9], the converter in view of the exchanging capacitors is displayed. Be that as it may, the converter contains an excessive number of parts, making the converter moderately confused. In [10], the converter highlights non-throbbing yield present, low yield voltage swell and basic structure. Be that as it may, the voltage pick up is not sufficiently high and is restricted since it must be controlled by the obligation cycle. In , a stage up consolidating a buck–boost converter and a KY converter is displayed. Contrasted and the KY converter, the displayed converter can accomplish a higher voltage pick up with just two aloof segments included. In view of the specified above, keeping in mind the end goal to accomplish a high yield voltage and have a non-throbbing current, a novel venture up converter is introduced. This converter consolidates a KY converter, a conventional synchronously-rectified (SR) help converter, and a coupled inductor with the turns proportion. In this way, the voltage pick up is higher than those of the converter having yield inductors in and can be dictated by changing both the obligation cycle and the turns proportion, which are of whole relationship. It is noticed that in the proposed converter, these two joined converters use the same switches. Furthermore, the proposed venture up converter has no floating yield, and in view of a yield inductor and synchronous rectification, the yield current is non-throbbing. Moreover, some portion of the spillage inductance vitality can be reused to the yield capacitor of the SR support converter. In addition, the proposed converter can be driven by just a single half-connect door driver without disengaged entryway driver. In this investigation, a point by point depiction alongside some exploratory outcomes is given to give the viability of the proposed converter.

II. Proposed Converter Topology

To disentangle the circuit investigation of the proposed converter, there are a few presumptions to be made as takes after:
(1) The coupled inductor is displayed as a perfect transformer but that one polarizing inductor Lm is associated in parallel with the essential winding and one spillage inductor Llk is associated in arrangement with the essential winding. Thusly the coupling coefficient k is defined as Lm/(Lm + Llk).
(2) The proposed converter works in the positive current mode. That is, the streams flowing through the charging inductor Lm and the yield inductor Lo are dependably positive.
(3) The dead circumstances between the two MOSFET switches are dismissed.
(4) The MOSFET switches and the diode are thought to be perfect segments.
(5) The estimations of the considerable number of capacitors are sufficiently huge with the end goal that the voltages crosswise over them are kept steady at a few esteems.
(6) The extent of the exchanging swell is insignificant.
Accordingly the little swell estimation will be embraced thus in investigation. The accompanying investigation contains the working standards, voltage pick up and limit conditions for polarizing and yield inductors. Innately, there are two working modes in the proposed converter. Fig. 2 demonstrates the perfect reproduced waveforms more than one exchanging period. Furthermore, the entryway driving signals vgs1 and vgs2 of the two switches S1 and S2 have the obligation cycles of (1 − D) and D, individually, where D is the dc calm obligation cycle made from the controller. There are two working states in the proposed circuit, to be portrayed as takes after.
State I: During this interim, as appeared in Fig. 3a,S1 is killed and S2 is turned on. In the meantime, both Lm and Llk are charged at the same time. Henceforth, the accompanying conditions, containing the coupling coefficient k, can be gotten State II: During this interim, as appeared in Fig. 1,S1 is turned on and S2 is killed. Lm and Llk are demagnetised what's more, Lo is charged, and part of the vitality put away in Lm and Llk can be exchanged to Cm.

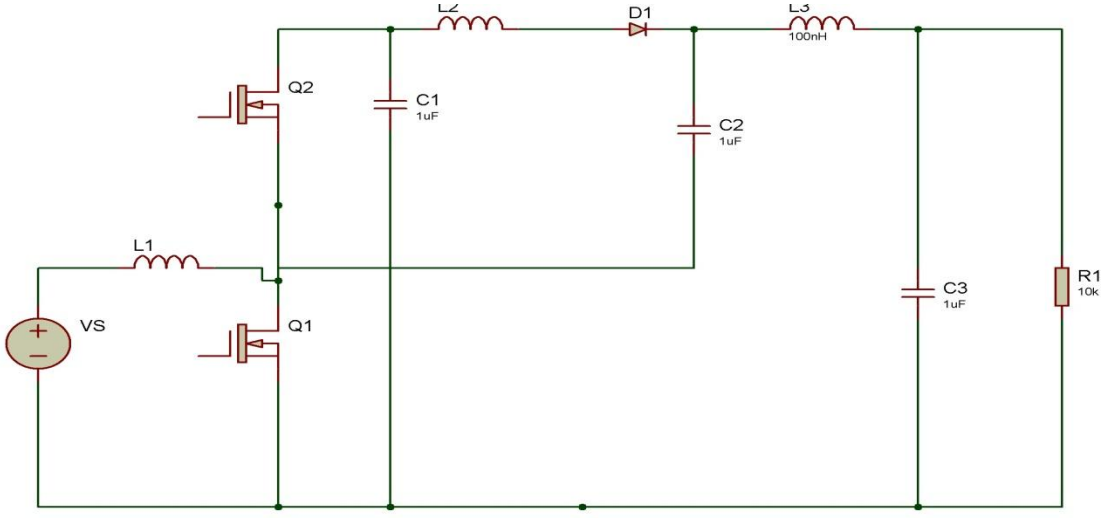

Fig 1.Propsed KY converter using coupled inductor

III. Simulation Results

Simulation implementation of proposed circuit is shown in Figure 2 and the circuit parameters are given in Table I. The closed loop voltage and current output of proposed converter topology is shown in figure 3 and 4. The open loop voltage and current output

of proposed converter topology is shown in figure 5 and 6. Using proposed converter input voltage is boosted in the ratio of four which is higher than the conventional KY converter.

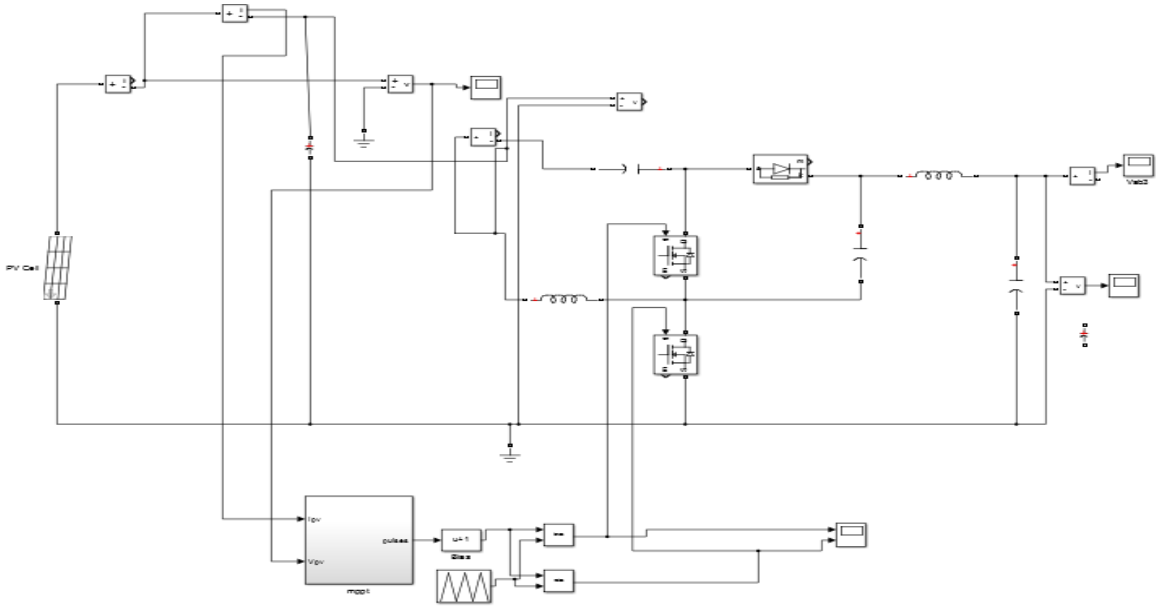

Fig 1.Propsed KY converter using coupled inductor

Table1. Simulation parameters

Converter Parameters	
Load Resistance Rl	10 ohms
Inductance L1, L2, L3	100e-6 H
Capacitance C1,C2	1uF
Turns ratio	1:3
Mutual Inductance Lm	0.000867 H

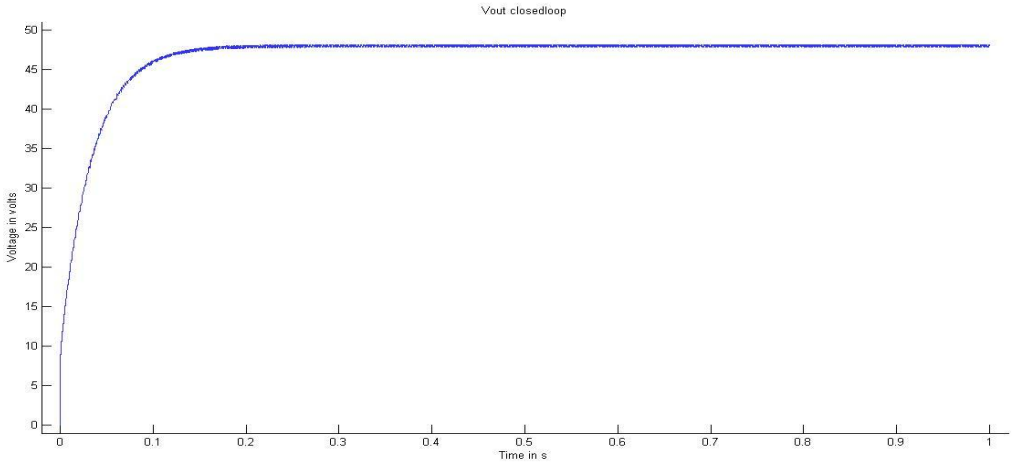

Fig 2.Closed loop voltage response of Proposed KY converter

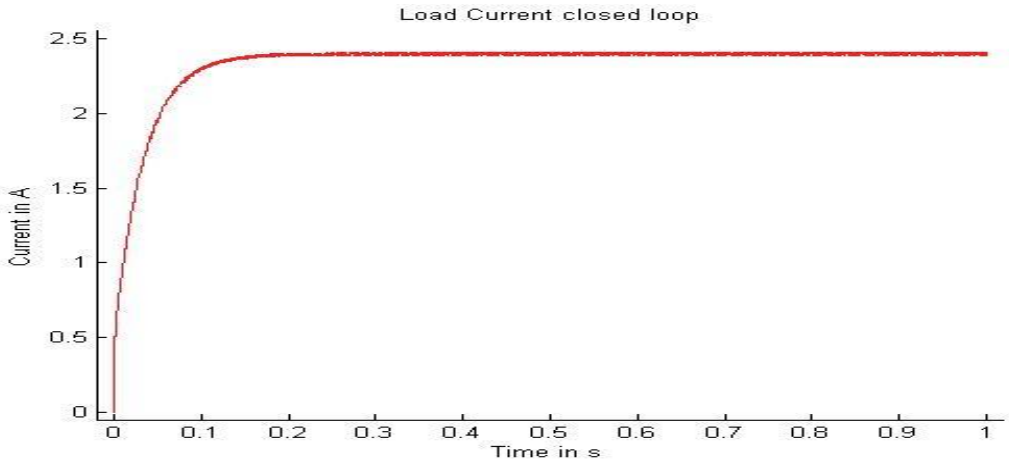

Fig 3.Closed loop current response of Proposed KY converter

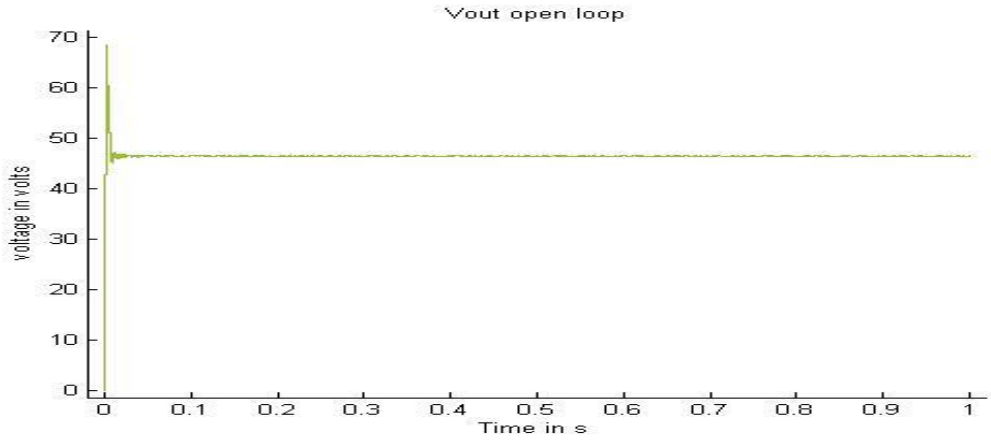

Fig 4.Open loop voltage response of Proposed KY converter

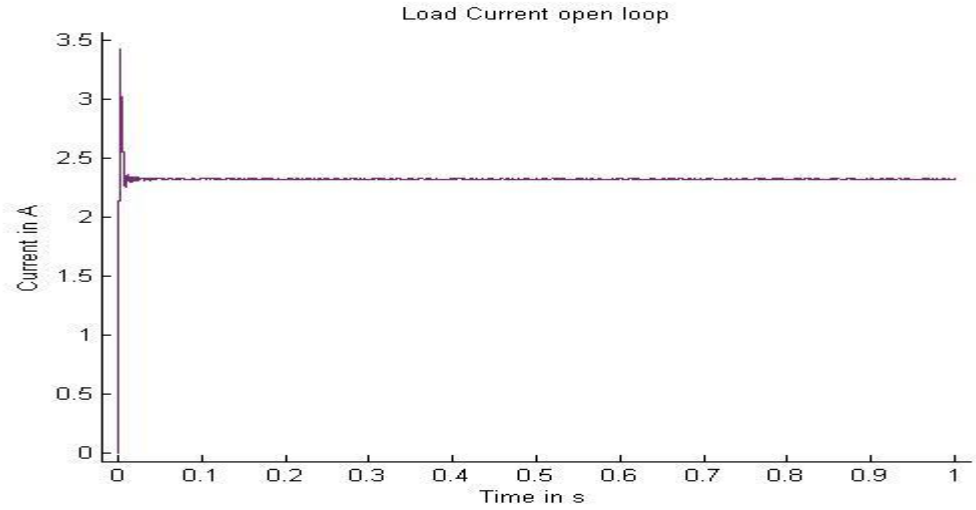

Fig 5.Open loop current response of Proposed KY converter

IV.Conclusion

A novel high stride up converter is displayed in this. By joining a KY converter, a customary SR support converter furthermore, the coupled inductor with the turns proportion, the relating voltage pick up is higher than the other two voltage increases of the customary lift converter and the existing KY support converter. Moreover, the proposed

converter has no floating yield and has one yield inductor so the yield current is non-throbbing due to synchronous rectification. What's more, thus, such a converter is appropriate for low-swell applications. In addition, this converter is driven utilizing just a single half-connect door driver, also, the structure of the proposed converter is straightforward and appropriate for mechanical applications.

References

[1]. W. L. Zeng et al., "DCM operation analysis of KY converter," in Electronics Letters, vol. 51, no. 24, pp. 2037-2039, 11 19 2015.
[2]. K. I. Hwu and W. Z. Jiang, "Voltage Gain Enhancement for a Step-Up Converter Constructed by KY and Buck-Boost Converters," in *IEEE Transactions on Industrial Electronics*, vol. 61, no. 4, pp. 1758-1768, April 2014.
[3]. Y. M. Sun and X. B. Wu, "Subthreshold voltage startup module for stepup DC-DC converter," in *Electronics Letters*, vol. 46, no. 5, pp. 373-374, March 4 2010.
[4]. Ping Yang, Jianping Xu, Guohua Zhou and Shiyu Zhang, "A new quadratic boost converter with high voltage step-up ratio and reduced voltage stress," *Proceedings of The 7th International Power Electronics and Motion Control Conference*, Harbin, 2012, pp. 1164-1168.
[5]. S. Kenzelmann, A. Rufer, D. Dujic, F. Canales and Y. R. de Novaes, "Isolated DC/DC Structure Based on Modular Multilevel Converter," in *IEEE Transactions on Power Electronics*, vol. 30, no. 1, pp. 89-98, Jan. 2015.
[6]. Y. Takeuchi, T. Mishima and M. Nakaoka, "New evaluations on soft commutation range of a soft switching PWM boost DC-DC converter with edge-resonant switched capacitor modular," *2011 IEEE Ninth International Conference on Power Electronics and Drive Systems*, Singapore, 2011, pp. 1172-1177.
[7]. M. Abbasi; J. Lam, "A Step-up Transformer-less, ZV-ZCS High-Gain DC/DC Converter with Output Voltage Regulation Using Modular Step-up Resonant Cells for DC Grid in Wind Systems," in *IEEE Journal of Emerging and Selected Topics in Power Electronics* , vol.PP, no.99, pp.1-1
[8]. Li, Hui, Kaiyu Wang, Da Zhang, and Wei Ren. "Improved performance and control of hybrid cascaded H-bridge inverter for utility interactive renewable energy applications." In Power Electronics Specialists Conference, 2007. PESC 2007. IEEE, pp. 2465-2471. IEEE, 2007.
[9]. J. C. Dias; T. B. Lazzarin, "A Family of Voltage-Multiplier Unidirectional Single-Phase Hybrid Boost PFC Rectifiers," in *IEEE Transactions on Industrial Electronics* , vol.PP, no.99, pp.1-1
[10]. T. Nouri, S. H. Hosseini, E. Babaei and J. Ebrahimi, "Interleaved high step-up DC–DC converter based on three-winding high-frequency coupled inductor and voltage multiplier cell," in *IET Power Electronics*, vol. 8, no. 2, pp. 175-189, 2 2015.