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Analysis of Two Input Boost- Converter

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Abstract: Here in this paper it mainly deals with boost converter. We know that the boost converter is mainly used for voltage step -up. Here mainly two-input hybrid boost SEPIC dc-dc converter is proposed in this paper. Actually the paper gives an integration of boost converter with the SEPIC converter. The proposed converter is capable of giving large duty ratios. Here 12/24V to 75V with output power capacity of 200W.

Keywords: Boost converter, Hybrid boost converter, Two input dc-dc converter.

INTRODUCTION

The conventional boost converter is capable of providing boosting of output voltage. It has mainly high advantages, such that boosting the output voltage. The problem of the operating boost converter under such extreme duty ratio impairs the efficiency, imposes obstacles for transient response, and also need of fast and expensive comparator .When the normal boost converter is used for large duty ratios it not gives good efficiency,it causes transient response[3].

CONVENTIONAL BOOST CONVERTER

The figure below shows the Hybrid boost converter.

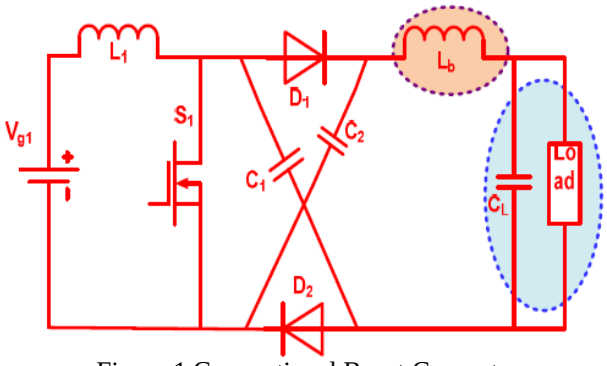

Figure 1.Conventional Boost Converter

Here the figure shows the hybrid boost converter. It mainly consist of inductors, capacitors, diodes, switch. Hybrid boost converter is mainly used for giving additional gain.

VG1= Input voltage
L1, Lb=Represents the inductance values
C 1,C 2, CL= Capacitors
D1, D2 = Diodes

Two input dc-dc converter

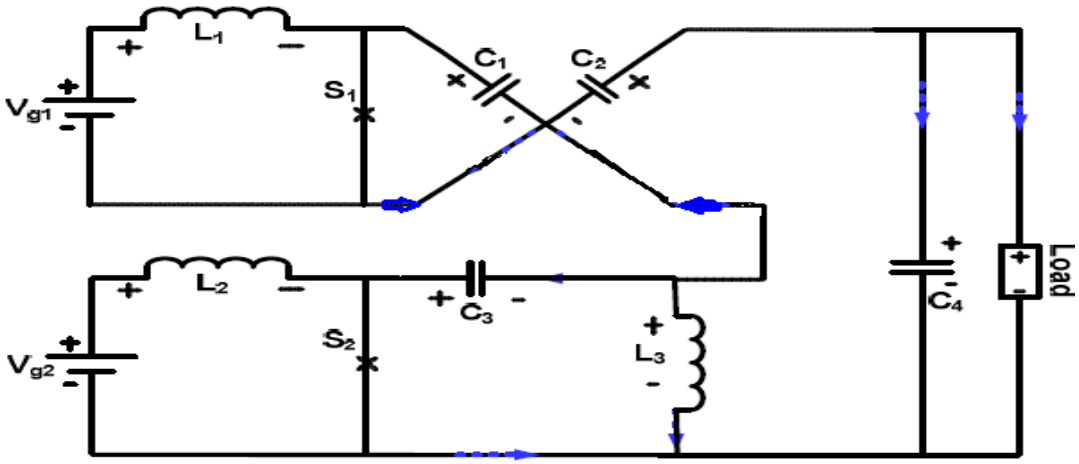

Figure 2.Two input boost converter

Here the figure shows two input dc-dc converter.VG1, VG2 are the input voltages, V0 is the output voltage. Depending on the power and the available load demand it mainly consists of three modes of operation.

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Mode	Devices-ON	Devices-OFF
Mode-1	S_1, S_2	D_1, D_2 ,D_3
Mode-2	S_1	S_2, , D_1, D_2 ,D_3
Mode-3	D_1,D_2	S_1, S_2, D_3

By applying Volt-Second Balance to inductors L1, L2, L3 the following expression for Output Voltage is obtained is given below.
Solving the equations we get

$$V_o = V_{g1}\frac{d_1}{(1-d_1)(1-d_2)} + V_{g2}\frac{d_2}{(1-d_2)(1-d_2)} \quad (4)$$

$$V_{g1}d_2 + V_{g1}(d_1 - d_2) + (V_{g1} - v_{c1})(1-d_1) = 0 \quad (5)$$

$$V_{g2} + v_{c1}(1+d_1-2d_2) - v_{c3}(1-d_2) - V_0(1-d_2) = 0 \quad (6)$$

$$V_0(1-d_2) - v_{c1}(1+d_1-2d_2) - v_{c3}d_2 = 0 \quad (7)$$

Here we obtained different equations. From that we are solving the different equations we get the value of Vc as follows.

Vc1=Vg1/ (1-d1)

MODES OF OPERATION

Mainly three modes of operation are there.Mode1, Mode 2, Mode 3

1. Mode 1(S1,S2 ON)
2. Mode 2(S1 ON,S2 OFF)
3. Mode 3(S1, S2 OFF)

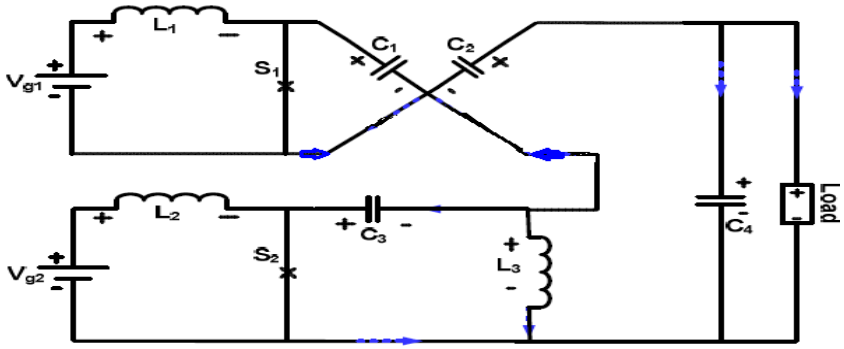

Figure 3. Mode 1 Operation (S1,S2 ON condition)

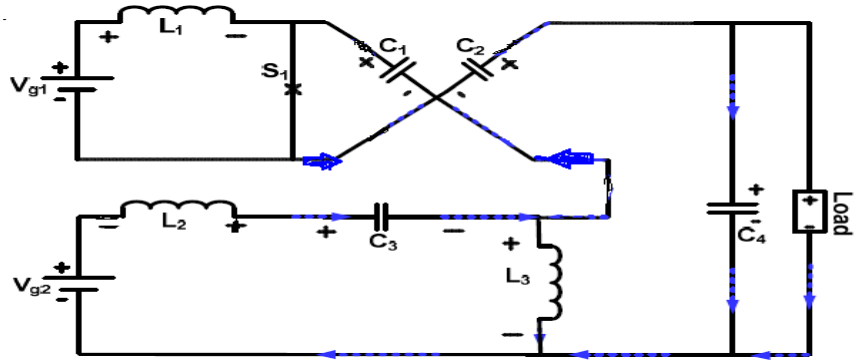

Figure 4. Mode 2 Operation S1 ON,S2 OFF

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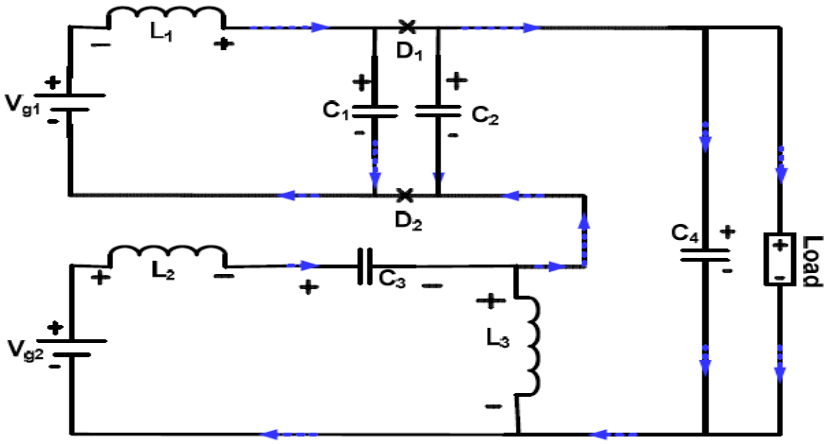

Figure 4. Mode 3 Operation, S1, S2 off condition

Here the figure shows the mode 1 operation. Here mainly two switches are there. Here in the mode one switch s1 and s2 are in the ON condition. Assume that in this mode L3 is in the discharging condition. Here in this condition current are flow through the c1,c2 to the load. In the mode 2 operation here switch s2 will be in off condition. So in this condition current flows through s1,c1,c2,c4, load. In the mode 3 condition here switch s1,s2 are in off condition. So this case the inductor will get discharge. So by that there the discharging current will be flows.

Element	BOSPC	HYBOSPC
L_1	576 μH	576 μH
L_2	960 μH	960 mH
L_3	570 μH	840 mH
C_1	480 μF	132 μF
C_2	720 μF	132 μF
C_3	-----	410 μF
C_4	-----	530 μF

Here the figure shows the values of the inductance and capacitance of the boost sepic converter and the hybrid boost sepic converter.

Device stress	BOSPC	HYBOSPC
Voltage stress of switch S_1	$V_{S1} = V_o(1-d_1)$	$V_{S1} = V_{g1}\left[\frac{1-d_1-d_2}{1-d_1}\right]$
Current stress of switch S_1	$V_{S2} = V_{g2}\left[\frac{1-d_1-d_2}{1-d_1}\right]$	$V_{S2} = V_{g2}\left[\frac{1-d_1-d_2}{1-d_1}\right]$
Voltage stress of switch S_2	$i_{S1} = \frac{V_o}{R}\left[\frac{d_2}{(1-d_1)(1-d_2)}\right]$	$i_{S1} = \frac{V_o}{2R}\left[\frac{1+d_1-2d_2}{1-d_2}\right]$
Current stress of switch S_2	$i_{S2} = \frac{V_o}{R}\left[\frac{d_2}{(1+d_2)^2}\right]$	$i_{S2} = \frac{V_o}{R}\left[\frac{d_2(1+d_2)}{1-d_2}\right]$

Here the figure shows the equations of the BOSPC and HYBOSPC [3].

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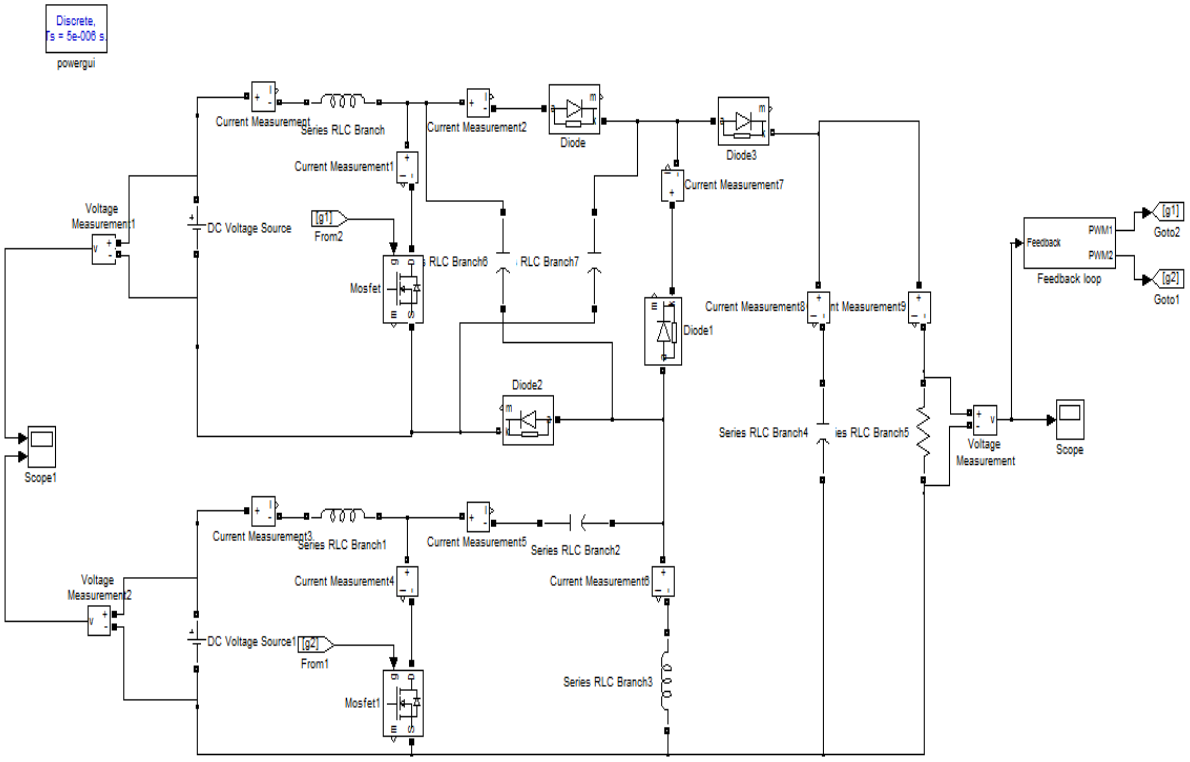
RESULTS AND DISCUSSIONS

Here the figure shows close loop simulation diagram of the converter. In the converter here PID controller is used.



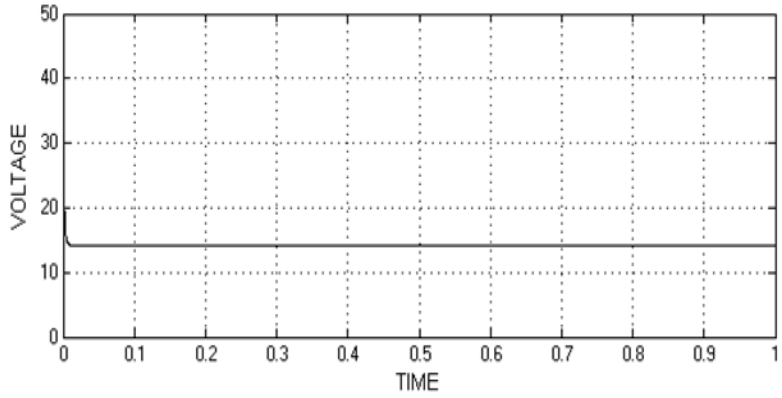


Figure 5: Input wave form of proposed converter

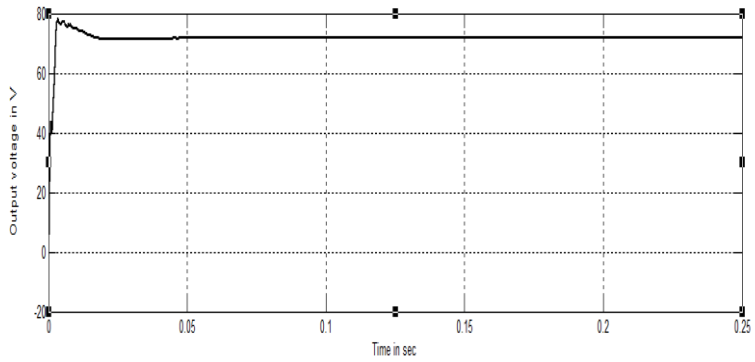


Figure 6: Output waveform of proposed converter

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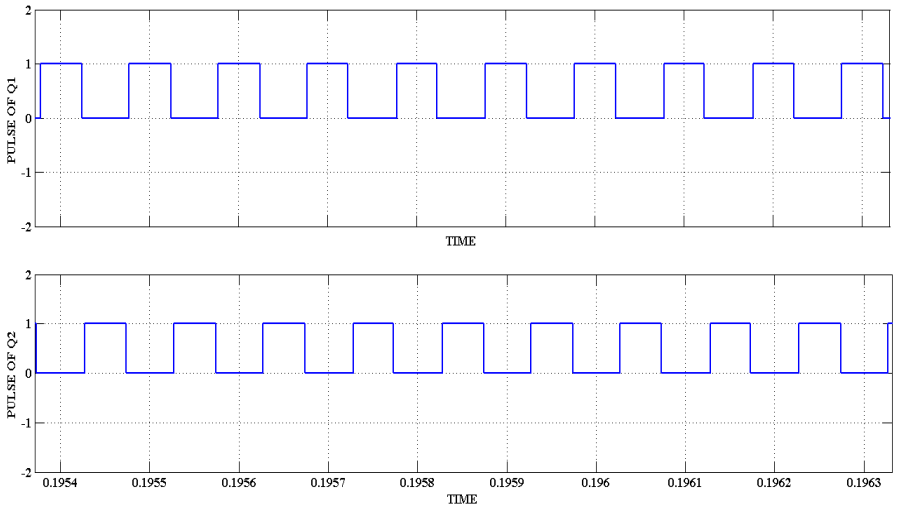

Figure 7: Pulse of Q1 and Q2

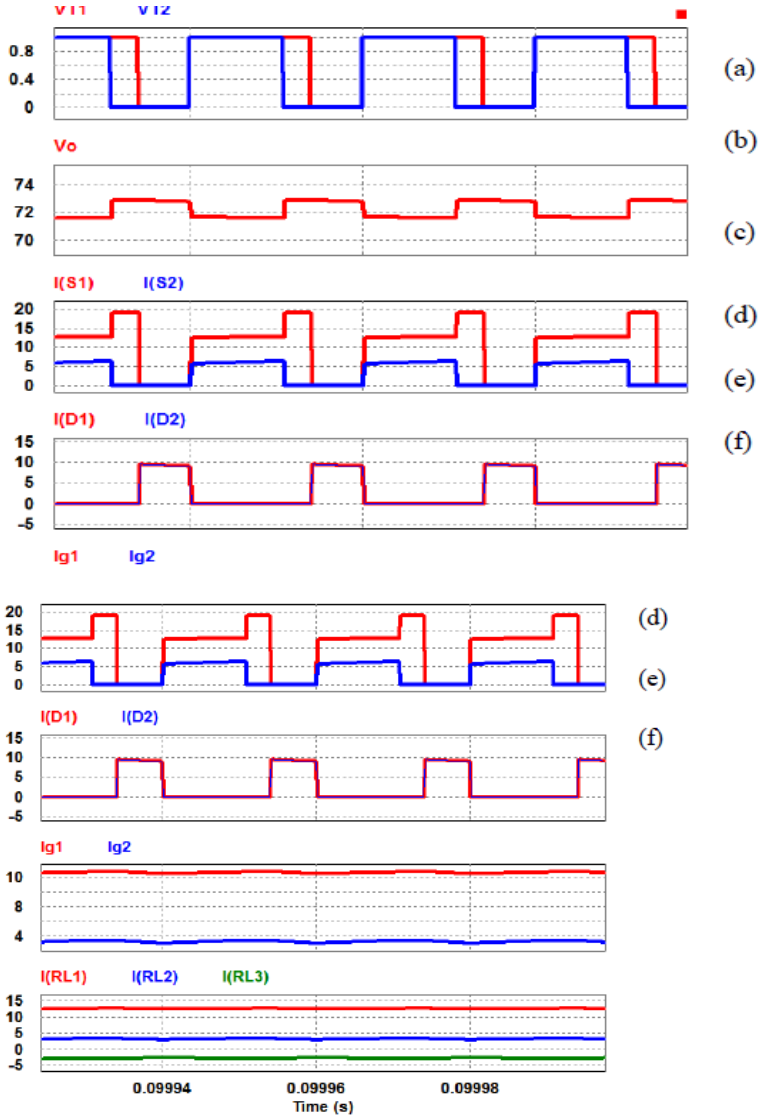

Fig. 1 . Simulation of **HYBOSPC (Red) & BOSPC (Blue)** (a) Switching sequence d_1, d_2, (b) Output Voltage, (c) Switch Currents, (d) Diode Currents, (e) Currents of Source-1 & 2 (f) Inductor currents through L_1, L_2, L_3

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Here in the figure shows the waveforms of steady-state output voltage. It shows the diode current, inductor current. In the proposed converter here input voltage applied is 12 v, the output obtained is 75 v. Here the output voltage taken is 200 w. Mainly two switches are used .In the figure below it shows the output voltage, diode current, inductor current, switch current e t c.

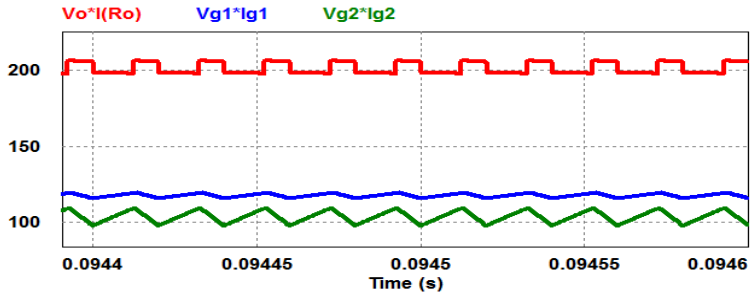

Figure 9: Load distribution of proposed converter

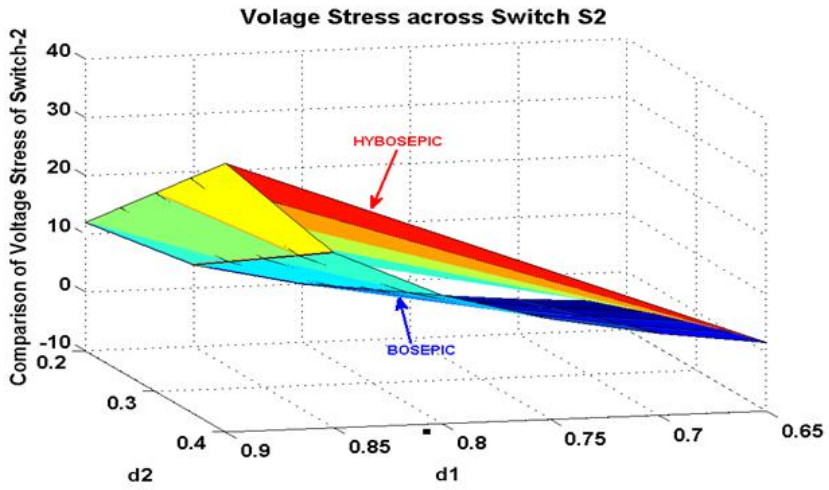

Figure 10: shows the voltage stress across the switch s1 and s2

CONCLUSION

The paper gives the basic about two- input dc-dc boost converter based on hybrid boost SEPIC converter .By using this type of converter it can be used to large duty ratios, and has obtain high voltage gains. It has main application is in solar systems. The main advantage is that here the output voltage can be regulated. Here closed loop simulation is done by using the PID controller.

REFERENCES

[1] Veerachary Mummadi, "Buck-integrated SEPIC converter for photovoltaic power conversion," in Proc. INTELEC, 2009, pp.1-5.

[2]. Hu, Lei, Young Jae Kim, Jung Min Kwon, and Hye Jung Cho. "A novel control strategy for DC/DC power converter of fuel cell hybrid system," in Proc. IECON, 2010, pp. 2765-2770.

[3] . Liu, Yuan-Chuan, and Yaow-Ming Chen, "A systematic approach to synthesizing multi-input DC–DC converters," IEEE Trans. Power Electron., vol. 24, no. 1, pp. 116-127, Feb. 2009.

[4]. R. Wai and C. Lin, "High-efficiency, high-step-up dc–dc converter for fuel-cell generation system," IEE Proc.–Elect. Power Appl., vol. 152, no. 5, pp. 1371–1378, Sep. 2005.

[5] Y. Hsieh, J. Chen, T. Liang, and L. Yang, "Novel high step-up dc–dc converter for distributed generation system," IEEE Trans. Ind. Electron., vol. 60, no. 4, pp. 1473–1482, Apr. 2013.

[7] W. Li and X. He, "Review of non isolated high-step-up dc/dc converters in photovoltaic grid-connected applications," IEEE Trans. Ind. Electron., vol. 58, no. 4, pp. 1239–1250, Apr. 2011.

[8] K. Tseng and C. Huang, "High step-up high-efficiency interleaved converter with voltage multiplier module for renewable energy system," IEEE Trans. Ind. Electron., vol. 61, no. 3, pp. 1311–1319, Mar. 2014.

[9] Kwasinski Alexis, "Identification of feasible topologies for multiple input DC–DC converters," IEEE Trans. Power Electron., vol. 23, no. 3, pp. 856-861, Apr. 2009.

[10] Modelling and analysis of two input dc-dc converter .2014 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES) Vargil Kumar. E, M. Veerachary Dept. of Electrical Engineering, IIT Delhi,

[11] Marchesoni, Mario, and Camillo Vacca. "New DC–DC converter for energy storage system interfacing in fuel cell hybrid electric vehicles." IEEE Trans. Power Electron.,vol. 22, pp: 301-308, Jan. 2007.

[12] T. Wu, Y. Lai, J. Hung, and Y. Chen, "Boost converter with coupled inductors and buck–boost type of active clamp," IEEE Trans. Ind. Electron., vol. 55, no. 1, pp. 154–162, Jan. 2008.

[13] E. H. Ismail, M. A. Al-Saffar, A. J. Sabzali, and A. A. Fardoun, "A familys of single-switch PWM converters with high step-up conversion ratio,"IEEE Trans. Circuits Syst. I, Reg. Papers, vol. 55, no. 4, pp. 1159–1171, May 2008.

[14] F. Luo and H. Ye, "Positive output super-lift converters," IEEE Trans. Power Electron., vol. 18, no. 1, pp. 105–113, Jan. 2003.

[15] L. Gu, X. Ruan, M. Xu, and K. Yao, "Means of eliminating electrolytic capacitor in ac/dc power supplies for LED lightings," IEEE Trans. Power Electron., vol. 24, no. 5, pp. 1399–1408, May 2009.