Dc Converters for Power System

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***Abstract*- high ratio capability converters (dc-dc) are proposed in the paper, they are derived from conventional converters. They are derived from conventional converters (buck, boost, buck-boost, cuk converters).parallel input and series output combination is achieved for higher efficiency. Simulations of various converters are also included.**

Index Terms- dc-dc converters, boost, cuk, buck-boost, duty ratio, ripple.

1. INTRODUCTION

Conventional boost and buck-boost converters are used for PV power generation into derived output voltage. by using conventional converters the maximum voltage gain will be less than or equal to 5.two converters are connected in cascade to obtain high gain. However efficiency will be low, derived converters with high voltage ratio is proposed in this paper, combined buck-boost converters and boost converters are used to form high ratio capacity converters.

2. PROPOSED CONVERTERS

2.1 DERIVED BOOST CONVERTERS

Two boost converters are combined to form a new converter. The input is parallel and the output is connected in series.

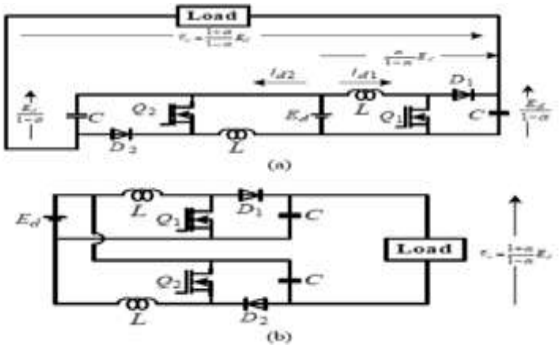


Fig1: Derived boost converters

Working: the supply voltage is given, when switch Q1 is turned on the inductor L does not allow sudden change in current hence inductor charges slowly at this instance the load is supplied by the capacitor , when the switch is off charge stored in the inductor and capacitor combines and high voltage is obtained at output side. When Q2 is on all the above steps are repeated for the other half. Switches Q1 and Q2 are complimentary switches.

2.2 DERIVED BUCK-BOOST CONVERTERS

Derived by combining two buck-boost converters. Voltage rating of switching device in derived converters is less than the output voltage the obtained converters will have high ripple content and input current will be discontinuous this may degrade the performance of the storage or PV system, this can be used as a two phase converter, hence input and output ripples can be reduced.

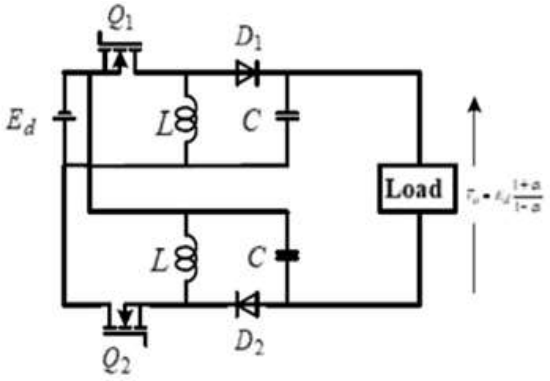


Fig2: Derived buck-boost converter

2.3 DERIVED BUCK-BOOST AND BOOST CONVERTER

The above derived boost and buck-boost converter are combined to obtain new converter. The input current ripple of this converter will be greater than boost derived converter.

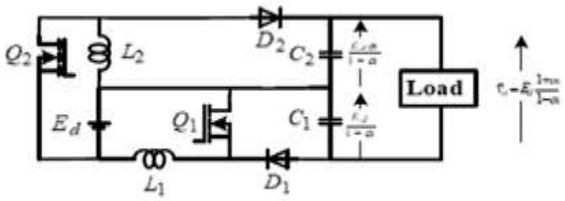


Fig3: Derived buck-boost and boost converter

3. EXPERIMENT AND DESIGN OF COMPONENTS

Input=36vdc
Inductance=1mH
Coupling coefficient=0.8
Capacitor c1 and c2=200microfarad
Carrier frequency=10khertz
Load resistance=50ohm
Switching device=power Mosfet
Switching frequency=4khertz

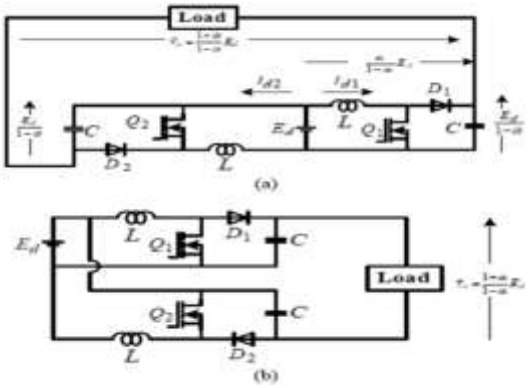
4. RIPPLE ANALYSIS

Analysis of inductor current ripple, source current ripple, output current ripple, and output voltage ripple are detailed here. Inductor current ripple analysis is important in determining the inductance. The source current ripple is important in determining the input filter capacitor. The output current and voltage ripples are important in determining the output filter capacitor. In analysis, it is assumed that the source is a constant dc voltage source with no ripple. The load is assumed as an inductive load so that it can be represented as a current source with no ripple. The switching devices are assumed as ideal switching devices.

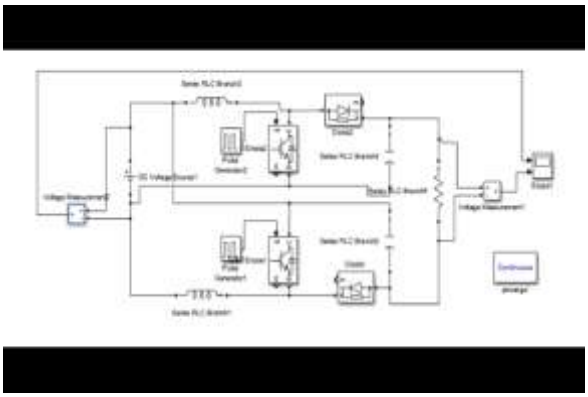
4.0 SIMULATIN AND EXPERIMENTAL RESULT

4.1 DERIVED BOOST CONVERTERS

(matlab simulation)

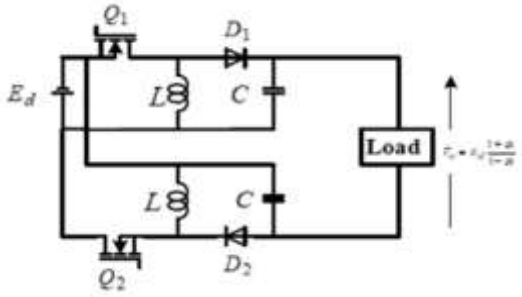


Matlab:

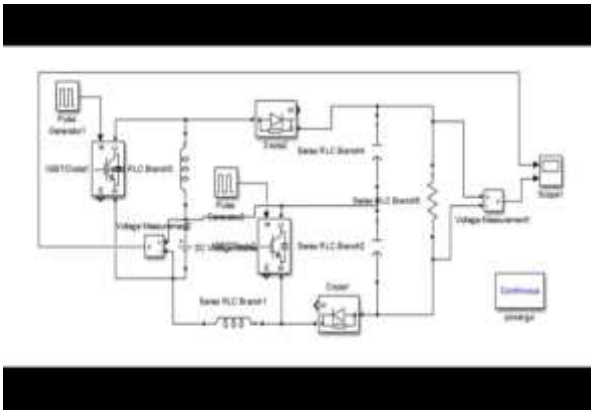


Output:

4.2 DERIVED BUCK-BOOST CONVERTERS

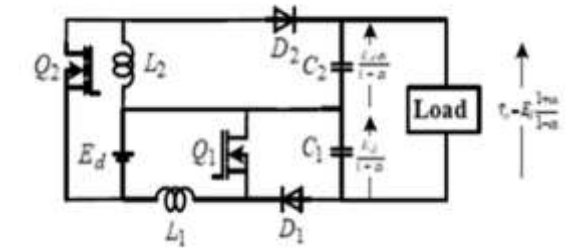


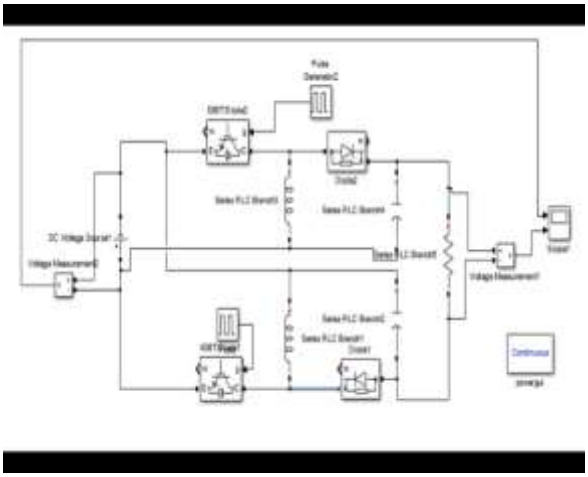
Matlab:



Output:

4.3 DERIVED BUCK-BOOST AND BOOST CONVERTER





Output: at duty ratio .5

Output at duty ratio .8

5. CONCLUSION

DC converters are proposed in this paper. The proposed converters have lower ripples and high voltage ratio capability. Compared to conventional boost converter, the efficiency of the proposed converter is better. The validity of the proposed converter has been shown by simulated and experimental results.

6. ACKNOWLEDGEMENT

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