HIGH VOLTAGE GAIN HALF BRIDGE Z SOURCE INVETER WITH LOW VOLTAGE STRESS ON CAPACITOR

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ABSTRACT-The half bridge z-source inverter is a new technology to improve the voltage gain. In this new technology provides zero voltage level at output. But in conventional half bridge inverter, the zero level voltage is not provided. This new technology will increase the output voltage level and stabilizes it in the desired value. Capacitor voltage stress in the proposed technology is low cost. A method to obtain high voltage gain by cascading z network and combining middle inductors is leads to reduction in cost, size and weight. Compared with conventional inverter, the half bridge z source inverter has excellent performance. The proposed inverter can produce different amplitudes during positive and negative half-cycles. By appropriate value of duty cycle it is possible to achieve the conventional half-bridge characteristics. Other advantage of this inverter is producing zero voltage level at output. This inverter can be used in different applications in industry such as electrochemical, electroplating and residential applications. In this paper, the steady state analysis of the proposed inverter in different operating modes is presented.

Keywords: Z-Source inverter, current-fed switched inverter, boost converter, AOD, SOD

1.INTRODUCTION

In Z-source inverter, capacitors voltage stress is high, therefore in quasi Z-source inverter (QZSI) has been presented to solve this problem. In switched inductor Z source inverter (SL-ZSI) has been introduced to obtain high voltage gains .Its main disadvantage is the increasing capacitor voltage stress in comparison with the conventional ZSI and QZSI. In a new topology called switched boost inverter (SBI) has been presented that its disadvantage is lower voltage gain in comparison with the conventional ZSI. In a new topology called current-fed switched inverter (CFSI) has been introduced to enhance characteristics of the presented SBI . To overcome the inrush current problems at start-up, capacitor voltage stress and obtaining high voltage gains, a topology called L-ZSI

In a quasi-Z-source half-bridge galvanic ally isolated dc/dc converter has been presented. The topology could be envisioned as an alternative to the boost half-bridge dc-dc converter but the benefit of its symmetric structure reduces the threat of transformer saturation due to the dc flux. In the half-bridge impedance source converter has been simplified by the implementation of the asymmetrical half bridge concept .So, its passive elements have large values. Source inverter based on cascaded switched inductors cells has been presented. Although developed topology has high voltage gain but voltage stress on capacitor is high. In this paper, a new topology for half-bridge Z-source inverter is proposed. In upcoming sections, first the proposed topology is introduced then different operating modes are analyzed and the critical inductances between SOD and AOD are calculated. Also extension of the proposed topology is discussed to obtain higher voltage gains. Comparison of proposed converter with conventional topologies is also provided. In the last section, the correctness operation of the proposed topology is validated by experimental result.

II PROPOSED SYSTEM

A new topology for half-bridge Z-source inverter is proposed such that the proposed topology has only one impedance network. Unlike to the conventional half-bridge inverter, the proposed topology can provide zero voltage level at the output. It also increases output voltage level and stabilizes it in the desired value. Capacitor voltage stress in the proposed topology is low, and, therefore, nominal voltage of capacitor and cost decreases. In this topology, it can produce symmetric and asymmetric voltage with different amplitudes during positive and negative half cycles.

For appropriate value of duty cycle it is possible to achieve the conventional half bridge characteristics. It can be used in electrochemical, electroplating and residential application.

OBJECTIVE

To improve the voltage gain in half bridge inverter by cascading the impedance network with low voltage stress on capacitor.

In this project, obtaining the high output voltage with low voltage stress on capacitor by using the half bridge z-source inverter. Here in this project we use the half bridge z source inverter to obtain the high output voltage. The half bridge z source inverter can be used as a buck-boost converter. There is no requirement of extra dc-dc converter to increase the voltage level. In this project the capacitor voltage stress will be reduced.

FEATURES OF THE PROJECT

A new topology of Z-source half-bridge inverter is proposed by using LC networks. The proposed inverter can eliminate shoot-through problems. This inverter produces zero voltage level, unlike to half-bridge inverter.

The proposed inverter can produce voltages with different amplitudes.

III. BLOCK DIAGRAM

From this the microcontroller used to set the triggering time, which is connected with the gate driver circuit.

Direct current may be obtained from an alternating current supply by use of a rectifier, which contains electronic elements (usually) or electromechanical elements (historically) that allow current to flow only in one direction.

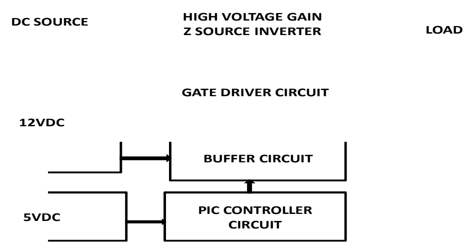


Fig BLOCK DIAGRAM

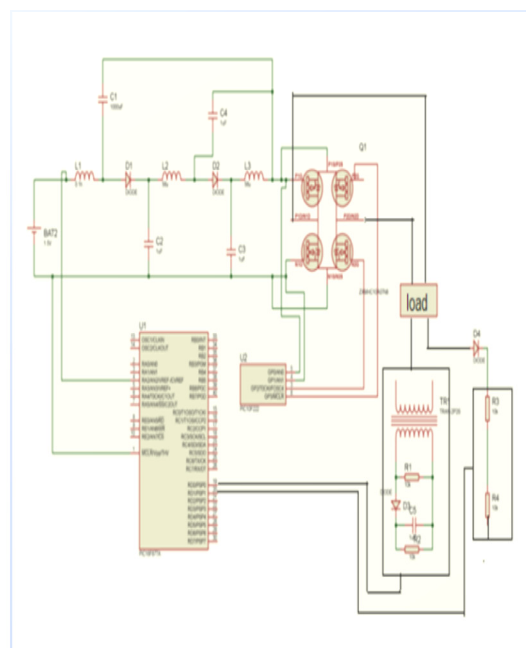
Direct current may be converted into alternating current with an inverter or a motor-generator set. This supply is given to the half bridge z source inverter. And this supply also can be given as the microcontroller input.

Driver circuits are most commonly used to amplify signals from controllers or microcontrollers in order to control power switches in semiconductor devices. Driver circuits often take on additional functions which include isolating the control circuit and the power and the power circuit, detecting malfunctions, storing and reporting failures to the control system, serving as precaution against failure, analyzing sensor signals, and creating auxiliary voltages.

And the buffer circuit can be controlled by the microcontroller, which is connected with the driver circuit. And a voltage buffer amplifier is used to transfer a voltage from a first circuit, having a high output impedance level, to a second circuit with a low input impedance level.

Finally the high output voltage can be obtained. And capacitor voltage stress can be reduced. Where the impedance network with the capacitors are connected in z form. This is known as the half bridge z source inverter.

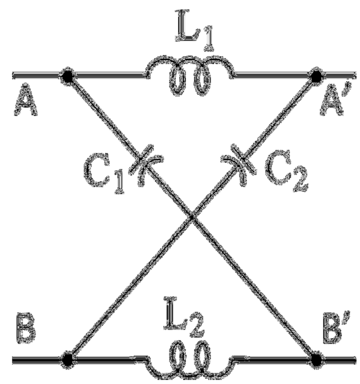
IV.CIRCUIT DIAGRAM



Z SOURCE INVERTER:

A Z-source inverter is a type of power inverter, a circuit that converts direct current to alternating current. It functions as a buck-boost inverter without making use of DC-DC Converter Bridge due to its unique circuit topology. Impedance (Z-) Source networks provide an efficient means of power conversion between source and load in a wide range of electric power conversion applications (dc–dc, dc–ac, ac–dc, ac– ac) . Z-source-related research has grown rapidly since it was first proposed in 2002 by Prof. F. Z. Peng. A comprehensive pulse width modulation scheme for Z-source inverters was proposed by Prof. P.Loh and Prof.D.M.Vilathgamuwa.Thenu mbers of modifications and new Z-source topologies have grown exponentially. Improvements to the impedance networks by introducing coupled magnetic have also been lately proposed for achieving even higher voltage boosting, while using a shorter shoot-through time. They include the Γ-source, T-source, trans-Source, TZ-source, LCCT-Z-source (proposed in 2011 by Dr Marek Adamowicz and utilizing high frequency transformer connected in series with two dc-current-blocking capacitors).Among them, the Y-source network (proposed in year 2013 by Dr Yam P. Siwakoti) is more versatile and can in fact be viewed as the generic network, from which the Γ-source, T-source, and trans-Z-source networks are derived . The incommensurate properties of this network open a new horizon to researchers and engineers to explore, expand, and modify the circuit for a wide range of power conversion applications.

In this proposed system the network consists of converter and inverter circuit. To obtain the AC output the inverter is used. And to obtain the high output voltage the transformer is connected with the inverter.



And this z source inverter the connection format is in z shape. And the z source inverter consists of inductor and capacitors. The combination of inductor and capacitor is defined as the electronic transformer. This transformer is used to boost up the DC voltage. This is known as the z source inverter. Where two capacitors used to reduce the voltage stress on the capacitor.

Tunnel, Gunn and IMPATT diodes exhibit negative resistance, which is useful in microwave and switching circuits.

CONCLUSION:

In this paper, a new topology for Z-source half-bridge inverter is proposed and its various operating modes were studied. In this proposed system the high voltage was obtained. Approach to reach high voltage gain through the series Z-networks and merging middle inductors which lead to less cost and weight were presented. Comparison results of the proposed inverter with various conventional inverters in terms of voltage gain and stress across capacitors prove its advantages. The proposed inverter against conventional half bridge topology can produce zero voltage level at output, too. Compatibility of results from experimental with the results extracted from theoretical calculation confirms the accuracy of content provided.

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