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Z SOURCE FED H-TYPE DIODE CLAMPED MULTILEVEL INVERTER WITH LESS NUMBER OF SWITCHES

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Abstract— **In this paper, simulation using MATLAB-SIMULINK is performed with bipolar triangular fixed amplitude multi-carrier Phase Disposition (PD) PWM strategy with sine wave and Third Harmonic Injection reference for the chosen Z Source based H-Type Diode Clamped Multilevel Inverter (ZSBH-Type DCMLI). The root mean square value of the fundamental component and THD of the output voltage which are the most important performance indices for the chosen inverter topologies are evaluated presented and compared for various references through duty ratios. From the simulation results it is observed that for both the reference the THD is almost similar but the root mean square value in terms of voltage is more for THI reference with phase disposition strategy.**

***Keywords*— -Source inverter, DCMLI, PWM, THD, Boost**

I. INTRODUCTION

Inverter is a power electronic device which converts DC into AC. Based on the nature of the input source; inverters are mainly classified as voltage source and current source inverters. DC link of current source inverters needs large DC chokes. So it has limited dynamic performance. This is the drawback of current source inverters. Voltage source inverters do not have high dynamic performance and have dv/dt problems. The demerits of the traditional voltage source inverters are compensated by the emergence of multilevel inverters. Multilevel Inverter (MLI) is made up of multiple switches. Multilevel inverter enables the use of environmental friendly energy sources like solar cells and fuel cells.

MLIs have problems of shoot-through state and MLIs can perform buck operation only. Impedance-Source (Z-Source) networks are extensively used to provide boost ability in such MLIs. Z-Source MLIs have single-stage power conversion capability, which make use of shoot-through and non-shoot-through states of the inverter bridge to provide boosted output voltage, thus achieving high immunity to the EMI noise. However, Z-Source MLI has noticeable flaws such as high voltage stress across the capacitors and switching devices, high inrush current and small boost ability. Another major drawback of the Z-Source MLI is the discontinuous input current that may lead to low utilization and permanent damage of the dc source.

Babaei et al[1] discussed about the reduction of dc voltage sources and switches in asymmetrical multilevel converters using a novel topology. Anderson and Peng [2] developed different types of quasi-Z-Source inverters. Babaei [3] introduced a cascade multilevel converter topology with reduced number of switches. Axelrod et al [4] suggested a switched-capacitor/switched-inductor structure for getting transformer less hybrid DC-DC PWMconverters. Astudillo et al [5] proposed a new symmetrical hybrid multilevel DC-AC converter. Al-Othman and Abdelhamid [6] proposed different method to elimination of harmonics in multilevel inverters with non-equal dc sources using PSO. Abdel et al [7] suggested a switched inductor boost converter for PV applications. Abu-Rub et al [8] Quasi-Z-source inverter-based photovoltaic generation system with maximum power tracking control using ANFIS. Aida Baghbany Oskouei and Seyed Hossein Hosseini [9] introduced a novel SVC algorithm for multilevel Z-source inverter. Anh-Vu Ho et al [10] made a Analysis and control of single- phase Z-source multilevel inverter. Weihua Liang et al [11] described about state of charge balancing control for battery energy stored quasi-Z-Source cascaded multilevel inverter based photovoltaic power system. Mohamed Trabelsi et al [12] introduced a 1-MW quasi-Z source based multilevel PV energy conversion system. The above literature survey gave some idea about the proposed work on Z source inverter and multilevel inverter. Balamurugan et al [13] developed hardware implementation of cascaded hybrid multilevel inverter with reduced number of switches. Balamurugan et al [14] also developed hybrid carrier PWM strategies for three phase h-bridge multilevel inverter. Balamurugan et al [15] introduced dspace based implementation of various inverted sine carrier PWM strategies for three phase five level h-bridge inverter. Vijayalakshmi and Balamurugan [16] made an investigation on Z-source based cascaded