Three Phase Multilevel Inverter Topology with RV method

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Abstract- Multilevel inverters have been widely accepted for high-power high-voltage applications. Their performance is highly superior to that of conventional two-level inverters due to reduced harmonic distortion, lower electromagnetic interference, and higher dc link voltages. However, it has some disadvantages such as increased number of components, complex pulse width modulation control method, and voltage-balancing problem. In this paper, a new topology with a reversing-voltage component is proposed to improve the multilevel performance by compensating the disadvantages mentioned. This topology requires fewer components compared to existing inverters (particularly in higher levels) and requires fewer carrier signals and gate drives. Therefore, the overall cost and complexity are greatly reduced particularly for higher output voltage levels. Finally, a prototype of the seven-level proposed topology is built and tested to show the performance of the inverter by experimental results.

Index Terms—Distributed Energy Resources, DC/AC power conversion, multilevel inverter, induction machines

Introduction

Mechanical examination prerequisites have rising to move higher force rating things as of late. Medium voltage rating machine drives and utility applications desire Inter medium voltage and megawatt limit level. It is totally hard to include surrendered one force semiconductor change in a flash to medium voltage framework. For this survey as a substantiate, a multi string multilevel force converter methodology has been told as an optional in high power applications and medium voltage necessities. A multilevel converter for high power appraisals, as well as other than upgrade the assess of renewable vitality sources and mechanical drive applications. With the rushed headway of force gadgets and developing patterns in popular multilevel converter topologies, it is advantageous to work at dissimilar voltage levels similarly the exemplary semiconductor limits. The multilevel converters having the fundamental mass to accomplish high voltage exchanging union by way of an arrangement of voltage ventures by the entire of regarded to the topology taken, each of which exists in the rating furthest reaches of the isolates power types of gear. The fell H-span topology (CHB) is particularly essential in high-voltage rating applications, seeing it requires the minority number of segments to blend the same number of voltage levels. These multi level converter topologies can create superb voltage waveforms with force semiconductor switches working at close to the basic recurrence. Additionally, in low-power applications, the exchanging recurrence of the force switches is not confined a low exchanging recurrence can improve the effectiveness of the converter. With furthermore to this, multilevel converters include a few dc joins, making conceivable autonomous voltage controls.

A solitary stage multi string five-level inverter connected commonly an assistant campaign was new presented for dc/air conditioning power change. This topology actualized in the force stage change offers an effective change in stipulation of disintegrate part include and depleted sounds yield. by the entire of impact to this Unfortunately, significant exchanging misfortunes
uncovered in the assistant travel created the
smooth cruising of the multi string five
openly inverter to be really 4\% slight than
that of the as per the book multi string three
sincerely inverter, a novel forlorn single
stage inverter commonly summed up no one
vectors (GZV) balance pattern was sooner
displayed to unwind the undertaking
arrangement. Anyway, this circuit boot still
just hast at one transfer in an unforeseen
voltage Alps for practical applications and
surmount debasement in the all over the
place proficiency as the business cycle of the
dc-side exchange of the front-end routine
maintain converter accomplishes solidarity.
They consider of betrayed transformer with
multi windings of the GZV based inverter get
the greater measure, load, and extra cost. The
recently actualized inverter topology
achieves exceptional favorable
circumstances one as exemplary and
upgraded yield waveforms, depleted channel
amount, and decrease EMI and everybody
music embellishment (THD). In this free of
cost, the working variable of the created
position is depicted, with the help of
MATLAB/SIMULINK Environment.

II. SYSTEM OPERATION
A general mean scene of different sorts of
inverter modules is exhibited. This freebee
displays a multi string multilevel inverter for
Distributed vitality Resources applications.
The multi string inverter stripped in figure 1
is a besides improvement regulated outline of
the string Inverter, by prudence of what a few
strings are incorporated by the entire of their
confine dc/dc converter to a typical inverter.
This brought together approach framework is
having more noteworthy advantages, for
every string in the circuit can be hesitant
separately. After derivations developments
are evidently assessed for another string by
the entire of a dc/dc converter can be
controlling into the present framework,
making an adaptable configuration with
profitable productivity rating. The single
stage multi string multilevel inverter
topology utilized as a part of this gift is show
in Figure 1.

![Figure 1. Schematic Of A Seven-Level Inverter In Single Phase](image)

In conventional multilevel inverters, the
power semiconductor switches are combined to
produce a high-frequency waveform in positive
and negative polarities. However, there is no need
to utilize all the switches for generating bipolar
levels. This idea has been put into practice by the
new topology. This topology is a hybrid multilevel
topology which separates the output voltage into
two parts. One part is named **level generation** part
and is responsible for level generating positive
polarity. This part requires high-frequency
switches to generate the required levels. The
switches in this part should have high-switching-
frequency capability. The other part is called
**polarity generation** part and is responsible for
generating the polarity of the output voltage, which
is the low-frequency part operating at line
frequency.
The topology combines the two parts (high frequency and low frequency) to generate the multilevel voltage output. In order to generate a complete multilevel output, the positive levels are generated by the high-frequency part (level generation), and then, this part is fed to a full-bridge inverter (polarity generation), which will generate the required polarity for the output. This will eliminate many of the semiconductor switches which were responsible to generate the output voltage levels in positive and negative polarities.

The RV topology in seven levels is shown. As can be seen, it requires ten switches and three isolated sources. The principal idea of this topology as a multilevel inverter is that the left stage generates the required output levels (without polarity) and the right circuit (full-bridge converter) decides about the polarity of the output voltage. This part, which is named polarity generation, transfers the required output level to the output with the same direction or opposite direction according to the required output polarity. It reverses the voltage direction when the voltage polarity requires to be changed for negative polarity.

**Fig. 2** Three-phase RV multilevel topology.

**Figure 3** Matlab/Simulink model of single phase multilevel inverter

*The basic simulation circuit, Figure 5 is a multi string inverter with a combination of six switches. Based on the selection manner of switches in the circuit output voltages are occurred.*

**Figure 4** Output voltage waveform of 7 level inverter using PWM
The induction machine is by far the most commonly used machine around the globe. Induction machines consume approximately one third of the energy used in industrialized countries. Consequently this type of machine has received considerable attention in terms of its design and handling. The induction machine is one of the older electric machines with its invention being attributed to Tesla, working for Westinghouse, in 1888. However, as with most great inventions there were many contributors to the development of this machine. The fundamental operation principle of this machine is based on the magnetic induction principle discovered by Faraday in 1831.

Induction Motors have been used in the past mainly in applications requiring a constant speed because conventional methods of their speed control have either been expensive or highly inefficient. Variable speed applications have been dominated by DC drives. Availability of thyristors, power transistors, IGBT and GTO have allowed the development of variable speed Induction Motor drives. The main drawback of DC motors is the presence of commutator and brushes, which require frequent maintenance and make them unsuitable for explosive and dirty environments.

CONCLUSION
IN THIS PAPER, INTRODUCING A SEVEN LEVEL STRING MULTILEVEL CONVERTER AND THREE STAGE MULTI STRING MULTILEVEL INVERTER CONNECTED TO ACTUATION MACHINE. THE MULTILEVEL TOPOLOGY COMPRISSES OF ALL H-SPAN CELLS AVAILABLE IN CHAIN, EACH A SURELY UNDERSTOOD ASSOCIATED WITH A STRING. COMPLETELY ANOTHER THREE STAGE MULTILEVEL INVERTER CONNECTED TO IMPELLING MACHINE. THE CONSEQUENT CONVERTER PRODUCES SUPERIORITY VOLTAGE LEVELS BY THE ENTIRE OF LESS DWELLING PLACE CHANGES CONTRASTED WITH H-SPAN SETUP. THIS WILL ABRIDGE NUMBER OF DOOR DRIVERS AND SAFETY MEASURE CIRCUITS, WHICH IN BEGIN DIMINISHES THE CHARGE AND HARD NUT TO OPEN OF THE CIRCUIT. NO DOUBT IN THE WORLD ABOUT IT A THREE STAGE MODEL WITH ACTUATION HARDWARE OF THE DRAWING NEARER CIRCUIT IS APPEARED FOR ASSESSING THE MACHINE EXECUTION AND RECREATION RESULTS ARE EXHIBITED.

References

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