

A Review on Cascade H-Bridge Multi Level Inverters

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Abstract- In this paper, we present a schematic comparative study about Diode clamped, Fly back and H-bridge multilevel inverter with different control techniques like PWM, SPWM, SVPWM, Thus cascade H- bridge Multi level inverter is chosen for review and study to overcome the problem of two-level inverter because its not possible to connect power semiconductor switches directly to medium and high voltage level. multilevel inverters reduced cost , harmonic distortions & good quality of output voltage waveforms.

Keywords-- Cascade H bridge Multilevel Inverters PWM, SPWM, SVPWM

I. INTRODUCTION

The utilization of electrical energy was easy and straight forward production of power & its utilization was a linear process but now a day's power system one of the complex networks in the world with invention of new techniques of power control and equipment which has better energy efficiency and reliable control techniques with fast and smart switching [1,3].

Before few decade For the operation of electric equipments switching of electric power was either through manually or through electromechanical switches but due to fast response, accuracy and high range the power electronics and solid state controllers and converters has been using Worldwide and in last two decades their uses increases very rapidly

With the help of multi level inverter we can get the output nearly to sinusoidal voltage waveforms by combining many isolated voltage levels[2]. A single-phase multilevel cascade inverter topology is essentially composed of single identical phase legs of the series-chain of H-bridge inverter, for balancing of system it can easily produce different output voltage waveforms

The multilevel inverter have more merits as compare to conventional two-level inverter that uses high switching frequency pulse width modulation (PWM) One more Substitute for a multilevel inverter is the cascaded multilevel inverter or series H-bridge inverter. The multilevel inverter has been showing its significance for the purpose of controlling and handling power high voltage since it was introduced in decade of 1980s[4].

II. MULTILEVEL INVERTER

Cascaded multilevel inverter contains high switching devices like MOSFET/IGBT to control gate signal.

Table: 1
Comparison between different multilevel inverter.

Topologies	Diode Clamped	Fly Back	Cascade H-Bridge
Advantages	Simple Control	Real Power Control	Least number of components
	High Efficiency	Reactive Power Control	No.of voltage levels same
Disadvantages	More number of clamping diodes according to levels	Complex Control according to levels	Separate DC Sources are required

III. LITERATURE SURVEY

In below table research survey by different researcher's and academician's

Table:2
Research Summary at a glance

Authors	Type of Inverter	Method/Techniques	Outcomes
Muhd Zharif et.al	Cascade H bridge Multi Level Inverter (CHMI)	control switching strategies	Comparison between Techniques
Abdelaziz et. Al.	Multi-Level Inverter	sinusoidal pulse width modulation 5 level	Comparative study MLI Inverters
FaridKhoucha et. al.	Multi-Level Inverter	direct torque control	Efficient Control
Liming Liu et. al.	Cascade H bridge Multi Level Inverter (CHMI)	power-distributed strategy	Effectiveness of Model
Chinnathambi Govindaraju et. al.	Cascade Multi Level Inverter	power loss minimization	Superior Performance
G.Sudhakar et. al.	Multi-Level Inverter	9 Level Inverter	Minimum number of Components
AtifIqbal et. al.	3Phase VSI	variable voltage variable frequency	Adjustable Speed Drive
Sandeep et. al.	3Phase VSI	(SVPWM)space-vector pulse width modulation	(FFT)Fast Fourier transform ,(THD) Total Harmonic Distortion
AbdolrezaEsmaeli et. al.	Multi-Level Inverter	Random pulse width modulation	acoustic noise and mechanical vibration
This Paper	7Level MLI 9Level MLI	pulse width modulation	L-L Peak Voltage L-G Peak Voltage

IV. CONTROL TECHNIQUES

There are many control techniques which is applicable for cascade multilevel inverter as well as other's multilevel inverter like fly back, diode clamped.

- Pulse Width Modulation
- Sinusoidal pulse width modulation
- Space-vector pulse width modulation

Pulse Width Modulation (PWM) technique represent the generation of constant amplitude pulse with the help of modulating the pulse duration by Modulating the duty cycle[6].The reference signal desire, signal output maybe sinusoidal or square wave, while the carrier signal is either a saw tooth or triangular wave at a frequency significantly greater than the Reference[].

Sinusoidal pulse width modulation technique multiple shows the numbers of output pulse per half cycle and pulses for different width of Individual pulse Varied in Proportion to the amplitude of a sine wave evaluated at the centre of the same pulse. This technique is simple and easier to use as a whole for switching frequency rather than choosing separate modulator for each phase.

V. CONCLUSION

This paper present comparative review of topologies Diode clamped, Fly back and H bridge multilevel inverter & also represent schematic development in the domain of control techniques such as PWM. SPWM, & SVPWM the Emphasis has been given to categorizing various PWM techniques which reported in the literature. In this paper there are three topologies: Diode clamped inverter, flying capacitor inverter, Cascade H-bridge inverter which have been discussed and analyzed considering all parameters and conditions. which helps the researchers to use proper techniques and topologies of multilevel inverter for renewable energy sources grid integration Therefore we deduce Cascade H bridge multi level inverter is very significant improvement to achieve the L-L Peak voltage , L- G Peak voltage , limit the harmonics distortion , dynamic transits of motor drive as well as stabilize the switching selection.

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