Abstract

MultiLevel Inverter (MLI) is used in applications that need high voltage and high current especially for Flexible AC Transmission System (FACTS) controllers. The topologies of multilevel inverter have several advantages such as lower Total Harmonic Distortion (THD), lower ElectroMagnetic Interference (EMI) generation and high output voltage. The main feature of Modular Structured Multilevel Inverter (MSMI) is the ability to reduce the voltage stress on each power device due to the utilization of multilevel on the DC bus. The advent of multilevel inverter topologies has caused variety of pulse width modulation strategies. In this paper, multi carrier pulse width modulation techniques are proposed which can minimize the total harmonic distortion and enhance the output voltage for five level cascaded MLI. Methodologies adopting the Constant Switching Frequency (CSF) and Control Freedom Degree (CFD) concepts are proposed in this paper. To validate the developed technique, simulations are carried out through MATLAB/SIMULINK for the chosen five level inverter. Harmonic analysis and evaluation of performance measures for various modulation indices have been carried out. The above methodologies are divided into two types of techniques like (I) phase disposition pulse width modulation which minimizes total harmonic distortion and (II) Carrier Overlapping Pulse
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Width Modulation (COPWM) which enhances the output voltage and higher DC bus utilization than non-overlapping PWM methods. The results also indicate that appropriate PWM strategies are to be employed depending on the performance measure required in a particular application of MLI based on the criteria of output voltage quality (peak value of the fundamental and dominant harmonic components).

References

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Index Terms

Computer Science

Power Systems

Keywords

MLI  MSMI  Carrier based Pulse Width Modulation (PWM)  sub harmonic PWM method

CFD  THD