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COMPARISON OF A NOVEL 15 LEVEL CASCADED ASYMMETRIC MULTICELL INVERTER USING PI AND FUZZY LOGIC CONTROLLER

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Abstract

This paper proposes a 15 level cascaded asymmetric multicell converter. With this new topology of inverter a cell consists of a dc source and two switches. The asymmetric DC sources are binary in progression. By cascading of the cells are capable of producing positive voltage levels which in turn called as auxiliary inverter. The output of auxiliary inverter is fed into main inverter to produce positive and negative output voltage levels (AC output voltage). Another noteworthy feature of this topology is that if any H-bridge fails, it can be bypassed and the configuration can still operate as a five level inverter at its full power rating. The Multi carrier based Level shifting Phase Disposition Pulse width Modulation (LS-PD-PWM) technique is involved to reduce the percentage of distortion. This paper also compares the performance analysis of the circuit by using Proportional Integral (PI) and Fuzzy Logic Controller which is used to produce reference signal for LS-PD-PWM. The complete system is modeled and simulated in MATLAB/SIMULINK environment. The results are obtained from proposed circuit shows that the circuit works properly to produce the multilevel output with low total harmonic distortion using the controllers. Simulation results show the effectiveness of the proposed topology of switching.

Keywords: Cascaded H- bridge multilevel inverter, Level shifting Phase Disposition Pulse width Modulation (LS- PD- PWM), Proportional Integral (PI)

1. Introduction

The recent trend to meet an ever-increasing energy demand is moving toward generating power with renewable energy source that may be dispersed in a wide area, and most of them are renewable, as they have greater advantages due to their environmentally friendly nature. Cascaded H bridge multilevel inverters overcome the disadvantages of conventional two level inverter through combining two H-bridge module together because of its level increasing