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A Modified Topology for Three Phase Asymmetric Multilevel Inverter

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Abstract: Motive behind this work is to accomplish the stable operation of asymmetric cascaded multilevel inverter (ACMLI) and development of distributed energy resources by photovoltaic's cell. Photovoltaic energy is one of the extensively used renewable energy. To obtain maximum efficient output voltage, ACMLI for voltage progression has been proposed. Three phase 27 level ACMLI with PV sources is considered in this paper. Peak levelinverter is used by whichresolutionisimprovedandtheharmonic content is reduced to a great extent. Prime objective behind this proposal is to decrease the number of switching devices used and a low complex design when compared with a conventional multi- level inverter. This structure considerably reduces utilization of switches, driver circuit, reduced design size and cost. Validity and the efficiency of MLI are confirmed by simulation. A prototype of the ACMLI is developed to validate the theoretical and simulation results.

Key words: Asymmetric cascaded multilevel inverter · ARM Core controller · Photovoltaic Source · Ternary voltage progression

INTRODUCTION

Multilevel inverter requiresnumerous DC sources. It attracts for immense number of renewable energy as a source requirement. Since last decades, renewable energy harvesting is increasing to meet an energy demand. With the increase in demand, RES are gaining more attention, particularly solar energy produced through photovoltaic (PV) isacquiring more attention[1-5]. Compare to other renewable sources, solar is the most considerable sources because it's widely available, modular, cost free, clean and more reliable. For high voltage- great efficiency operation, MLI has attainedwidespread acceptance. With increasing the output level of inverter, more or less a nearwaveform for sinusoidal magnitude can be formed and the advantages are improved by decreasing the number of harmonic content. The different types of MLI are diode clamped, flying capacitor, cascaded MLI [6].

Cascade multilevel inverter (CMLI) is latest and widespread type of soft conversion technique that blends a anticipated output voltage from more than a few levels of DC voltages as inputs. The need of the MLI has paved way as explanation to obtain the improved high converter output voltage beyond the predefined voltage restrictions of traditional semiconductor. The traditional sinusoidal waveform is produced more conventionally with step by step order which reduces the disturbances or harmonics produced in the output. They are broadly used in workplaceswhere they use electrical motors likeBLDC motor, alternating power supply, high operation converters and drive systems, etc. Number of voltage levels compiled together gives MLI output waveform. The cascaded has disadvantage, it requiresdistinct DC input sources still circuit design is not complex and sharing of voltage doesn't arise any disturbance. Application for the givenCMLIusing RES is reviewed in [5] and [6]. Due to extensive advantages, the CML inverter bridge has been extensivelyapplied to the applications as High Voltage DC, SVC, stabilizer, high power motor drive [6-7].

Owing to this advantage, the ternary MLI is built with PV cell to alleviate the problem of increasing the demand of separate DC sources. Input to the proposed prototype is obtained from PV modules. Prominence of proposed design is attributed by its characteristics than other two types of PLI's, clamped diode's and alignment of capacitors clamped. The CMLIis anarrangement of multiple H- Bridge units. It is a low cost solution in non-high voltage applications. When proper control techniques are implemented, level of output voltage increases which yields nearly sinusoidal waveform. It gets

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