

Abstract

Operation control of multilevel inverter for induction motor

This paper introduces theoretical and experimental analysis of 3-ph induction motor operated from 12 semiconductor switches connected in the form of neutral point clamped multilevel inverter. The general objective of a multi-level inverter is to synthesize a near sinusoidal voltage from several levels of DC voltages as a staircase (discrete) shaping waveform. A brief comparison of multilevel inverter has been introduced. Simulation models of the NPC inverters with different number of switches have been carried out using Simulink under MATLAB. Methods to increase number of levels (steps), hence reducing filter requirements and total harmonic distortion by increasing number of switches or controlling the firing patterns of the switches are suggested and analyzed. Controlling the switching pattern of the three-phase multi-level inverters to eliminate certain harmonic order in stator voltage of the three-phase induction motor is explained and analyzed. Motor speed response together with voltage and current waveforms for each configuration are obtained and discussed. Experimental setup has been designed, implemented and tested for practical validation.