Comparative Study of the Total Harmonic Distortion Voltage Evaluation for a Multilevel Inverter

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Abstract:

This study presents comparison analysis between a theoretical evaluation method and analytical evaluation method of voltage Total Harmonic Distortion (THD) for single phase multilevel pulse width modulation (PWM) inverter. The first method consists of using a time domain approach which provides piecewise analytical solutions accounting for all switching harmonics. This approach is an alternative to a numerical method in the frequency domain with limited harmonics count and infinite double Fourier series expansion. The method is based on the Normalized Mean Square (NMS) criterion to calculate voltage Total Harmonic Distortion. The chosen topology for the Multi-Level Inverter (MLI) is the cascaded H-Bridge multilevel (CHB-MLI). The second method consists of measuring THD in Matlab/Simulink for an arbitrary number of inverter levels (L) but a frequently number encountered in the literature or in practice. Modulation index (m) is varied between 0.1 and 1 in small steps. The obtained results in both methods are compared and carried out in graphs for each level of the inverter.

Keywords:

Multilevel inverters, Normalized Mean Square. Cascaded H-Bridge, Total harmonic distortion.