

WIDE RANGE MODULATION INDEXES FEATURING CARRIER-BASED PWM STEPPED WAVEFORM FOR HALF-BRIDGE MODULAR MULTILEVEL CONVERTERS

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ABSTRACT: This paper presents simulation results of the influence of wide range modulation index values (m_a) in carrier-based PWM strategy for application in generating the stepped waveform. The waveform is tested for application in single-phase half-bridge modular multilevel converters (MMCs) topology. The results presented in this paper include a variation of the fundamental component (50 Hz) in the voltage output. It also studies total harmonic distortion of the output voltage (THD_v) and the output current (THD_i) when the modulation index is changed over the linear-modulation region, $0 < m_a < 1$. It also explores the effect of a modulation index greater than 1. Moreover, different output voltage shapes, as a consequence of varied m_a on MMCs, are also illustrated for showing the effect of varying the value of m_a on sub-module of MMCs.

ABSTRAK: Penulisan ini berkenan simulasi pengaruh pelbagai nilai indeks modulasi (m_a) dalam strategi PWM berasaskan aplikasi dalam menghasilkan bentuk gelombang yang bertingkat. Bentuk gelombang ini diuji untuk aplikasi dalam topologi MMCs. Penilaian dan hasil dari artikel ini termasuk variasi komponen asas (50 Hz) dalam voltan keluar. Ia juga meneliti jumlah penyelarasan harmonik voltan keluar (THD_v) dan arus keluaran (THD_i) apabila indeks modulasi ditukar dalam rantau modulasi linear, $0 < m_a < 1$. Ia juga meneroka kesan indeks modulasi lebih daripada 1. Selain itu, bentuk voltan keluar yang berbeza sebagai akibat dari pelbagai m_a pada MMCs juga digambarkan untuk menunjukkan kesan berbeza-beza nilai m_a pada sub-modul MMCs.

KEYWORDS: PWM; converter; stepped waveform; MMC; THD