An analysis of voltage space vectors' utilization of various pwm schemes in dual-inverter fed five-phase open-end winding motor drives

I Nyoman Wahyu Satiawan, author

Abstrak

This paper analyzes voltage space vectors' utilization of various Pulse Width Modulation (PWM) schemes in dual-inverter fed five-phase open-end winding motor drives with equal DC-link voltage. The applied voltage space vectors in three PWM schemes were examined. These three schemes were: the Equal Reference Sharing (ERS) PWM, the Unequal Reference Sharing (URS) PWM, and the Decomposition PWM. The results of these examinations show that the ERS scheme utilizes only 21 of the 211 available voltage vectors, and that the URS scheme utilizes more voltage vectors than the ERS scheme. The number of vectors applied in the URS scheme varies according to the modulation index and angular position of the voltage references. Consequently, the URS scheme produces better voltage output quality than the ERS scheme. Of the three schemes, the Decomposition PWM applies the most effective voltage vectors and produces the best voltage output quality, which is indicated by the lowest value of Total Harmonics Distortion (THD). This paper also proposes a new switching strategy that inherently improves the power sharing capability of the converter, thus avoiding the increase in the DC-link voltage of inverter that operates in PWM mode.