

电力电子与电力传动

三电平双组双调制波载波脉宽调制方法

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摘要: 中点电位不平衡问题是三电平中点钳位(neutral point clamped, NPC)逆变器的固有问题, 目前的中点电位平衡方法或者在部分条件下无法完全消除中点电位低频波动, 或者存在开关频率偏高的问题。提出一种双组双调制波载波脉宽调制(double-group double-modulation-wave carrier-based pulse width modulation, DGDMPWM)方法。DGDMPWM由平均中点电流大小相等方向相反的两组双调制波根据中点电位的方向进行切换调制, 既能完全消除三电平NPC逆变器的中点电位低频波动, 又具有开关频率较低的优点。详细阐述该脉宽调制(pulse width modulation, PWM)的基本原理, 并通过仿真和实验研究验证了该PWM的有效性。

关键词: 三电平中点钳位逆变器 双调制波载波PWM 双组双调制波载波PWM 中点电位低频波动

Three-level Double-group Double-modulation-wave Carrier-based PWM Method

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Abstract: Neutral-point potential unbalance is an inherent problem stems from the three-level neutral point clamped (NPC) inverter. The current methods for neutral-point potential balance have the disadvantage of incompetence in the elimination of low frequency neutral-point potential ripple for the three-level NPC inverter in some conditions, and the shortcoming of producing high switching frequency. A new double-group double-modulation-wave carrier-based PWM (DGDMPWM) was proposed in this paper. Based on the direction of neutral point potential, two groups of double-modulation-waves with equal and opposite averaged neutral point currents were used to implement switch modulation in DGDMPWM, which has a low switching frequency and can completely eliminate low frequency neutral-point potential ripple of the three-level NPC inverter. The fundamental principle of the proposed PWM was introduced, and verified with simulation and experimental results.

Keywords: three-level neutral point clamped inverter double-modulation-wave carrier-based PWM (DMWPWM) double-group double-modulation-wave carrier-based PWM (DGDMPWM) low-frequency neutral point potential ripple

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