



A ripple current minimisation based single phase PWM inverter

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Abstract:

This paper is aimed at improving the output voltage waveform of a single phase PWM inverter. Two approaches is proposed, the first approach is based on selected harmonic elimination (SHE) of order up to 7th harmonic, for minimising harmonic distortion and modulating amplitude of the fundamental component of the output voltage waveform. For the first time, the Levenberg-Marquardt algorithm (LMA) is used for determining the switching angles of the inverter switches. The second approach is based on ripple current minimisation using LMA. A simulation model is developed using PSIM for the inverter to verify the proposed approaches. An experimental system was implemented to demonstrate the effectiveness of the proposed approaches by using PIC16F877 microcontroller. Analysis of the voltage THD as influenced by the amplitude modulation index is made using MATLAB based on the computed switching angles.

Keywords:

single phase PWM inverters; pulse width modulation; LMA; Levenberg-Marquardt algorithm; switching angles; ripple current minimisation; selected harmonic elimination; output voltage waveform; harmonic distortion; amplitude modulation; simulation; microcontrollers.

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