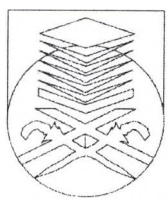
MODELING OF THREE-PHASE HARMONIC RECTIFICATION SCHEME USING CURRENT INJECTION TECHNIQUE



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ABSTRACT

A new harmonic reduction of the three-phase rectification concept with harmonic current injection technique is developed using three-phase inverter as a current injection device. The injection current based on zero-sequence triplen-odd harmonic will automatically generate and then circulated through the ac side of the three-phase rectifier via the Zig-Zag transformer which provides low-leakage impedance for the current harmonics generated, resulting in pure sinusoidal input current in the three-phase diode bridge rectifier.

The injection principle is graphically explained in current waveforms and mathematically proved. The current injection methods are proposed to meet either the THD requirement or the IEEE-519 recommended guidelines and standards. The analysis, design of the modeling, and simulations are presented to determine the performance of the new proposed scheme with the different conditions. The modeling and simulation of the new proposed current injection device are verified and compared with a 1.5-kVA prototype provide by previous approach done by using the same parameters.

The Three-Phase PWM Inverter design is discussed with a simple power control and reference signal model developed to make inexpensive cost for a new proposed scheme. Besides, the existence of three-phase inductor at the load side are being discuss in term of effective THD of the output current waveform. The selected results are being present and verified by simulation in Matlab/Simulink software.