

Design of a PWM for UPS with Pulse Dead Time

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ABSTRACT : This paper presents a new design of a power width modulator PWM with and without dead time for each PWM pulses based on specific criteria given. In order to study and design a new model of PWM inverter and to show the effects of dead time on the PWM which was designed and achieved. In this paper, comparison between PWM with & without dead time. The design methodology comprises of the calculations and results analysis. P-Spice simulator was used as a tool to verify the results. The effectiveness of the proposed technique was confirmed. All the waveforms voltage, current, and power achieved and discussed.

Keywords – PWM, Modeling, power electronics design, Harmonics elimination, and inverters.

I. INTRODUCTION

One of the main problems encountered in open-loop pulse width modulation inverter (PWM) drives is the nonlinear voltage gain caused by the non ideal characteristics of the power inverter. The most important nonlinearity is introduced by the necessary blanking time to avoid the so-called shoot through of the dc link. To guarantee that both switches in an inverter leg never conduct simultaneously a small time delay is added to the gate signal of the turning-on device.

This delay, added to the device's finite turn-on and turn-off times, introduces a load dependent magnitude and phase error in the output voltage. Since the delay occurs in every PWM carrier cycle the magnitude of the error grows in inverse proportion to the output fundamental frequency, introducing a serious waveform distortion and fundamental voltage drop. The voltage distortion increases with switching frequency introducing harmonic components that, if not compensated, may cause instabilities as well as additional losses in the machine being driven [1].

The output voltage distortion is the finite voltage drop across the switches during the on state the dead time necessary to prevent the short circuit of the power supply in pulse width modulated (PWM) voltage inverters results in output voltage deviations. Although individually small, when accumulated over an operating cycle, the voltage deviations are sufficient to distort the applied PWM signal [2].

The top and bottom switch has to be "complementary", i.e. if the top switch is closed (on), the bottom must be off, and vice-versa. In practical, a dead time as showed below is required to avoid "shoot-through" faults as showed in Fig.(1) [3].

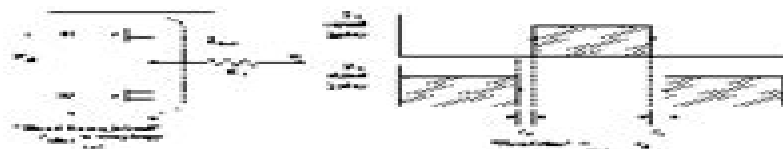


Fig.1 (a) Shoot through fault, (b) Deadtime waveform

Based on various circuit topologies and modulation strategies have been reported for better utilization of multilevel voltage source inverters. Multilevel topologies are classified in to three categories: diode clamped inverters, flying capacitor inverters and cascaded inverters. The topologies have an equal number of main switches [4].

Design Of A Pwm For Ups With Pulse Dead Time Ajer

V. Quercioli



Design Of A Pwm For Ups With Pulse Dead Time Ajer:

Pulse Width Modulation In Power Electronics Isaak D Mayergoyz, Siddharth Tyagi, 2021-05-05 This book provides a theoretical discussion of pulse width modulation PWM in power electronic inverters Pulse width modulation is widely used for the frequency control of speed of ac motors the design of uninterruptible power supplies UPS as well as the integration of renewable energy sources into existing power grid systems PWM technique is based on approximation of sinusoidal waveforms by sequences trains of rectangular pulses whose widths are properly modulated This width modulation results in the suppression of low order harmonics at the expense of amplification of high order harmonics which are suppressed by energy storage elements in load circuits The discussion covers various PWM techniques with a focus on the optimal time domain PWM techniques proposed by the authors Pulse Width Modulated (PWM) Power Supplies V. Quercioli, 1993-04-30 A restricted source of power supply is analysed in this book namely the switching mode power supplies SMPS which utilise the Pulse Width Modulation PWM technique to operate Even though restricted such a class of power supply is vital to circuits as most of modern electronic equipment is dependant on this form of technology to feed electronic boards Its main advantages are greater efficiency and its minimum physical size and weight Interdisciplinary knowledge such as circuit theory semiconductor devices theory and technology magnetics theory and technology linear and nonlinear control theory is involved in the design of an SMPS This volume provides designers with an in depth overview on the latest interdisciplinary methods involved in the design of switching mode power supplies providing the reader with a tool whereby the learning time can be reduced and information about switching mode power supplies design processes can be easily accessed The book adopts a systemic approach subdividing the information into functional blocks whose properties and relationships are evaluated and compared with each other A comprehensive list of references to the literature is given thus enabling the reader to follow up on more detail **Design Switch Mode Power Supply (SMPS) Using Pulse Width Modulation (PWM) Controller Technique** Mohd Shahrudin Harun, 2007

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