

**FIVE-PHASE SPACE VECTOR MODULATION VOLTAGE
SOURCE INVERTER USING LARGE, MEDIUM AND ZERO
VECTOR COMBINATION TECHNIQUE**

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ABSTRACT

The development of power electronics toward the future is massive and leads to the application of electric drives with the number of phase greater than three such as the multi-phase inverter. This project is about to generate five-phase AC voltage waveform from the five-phase space vector modulation VSI using the combination of active (large and medium) vector with zero vector switching technique and analyzed its result by implementing the switching technique into the simulation and record the performance of the output at the load. The Low Order Harmonic (LOH) such as 3rd, 5th and 7th harmonic produce by d3-q3 subspace will be reduced by using the combination of large, medium and zero vector technique. In this project also, the implementation of hardware of five-phase voltage source inverter by interfacing using the ezDSP TMS320F2812 also will be introduced. The DSP will generate an analogue output by the coding from the MATLAB/SIMULINK in order to generate the space vector pulse width modulation for the inverter circuit. By using this five-phase source inverter hardware, the output waveform of phase voltage, line-to-line voltage and the pole voltage could be analyzed.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

For a past few years ago, the industry back then applied the three-phase systems for the three-phase machinery for its uncomplicatedness [1]. To control the behaviour of the three-phase machinery, three-phase electrical drives were used. On the other hand, since this drives for the three-phase machine used the power electronic converter for their supply, the number of phases for the machine was principally limitless [2]. Thus, a multiphase drives was introduced.

As the countless of research and development upon the making of power electronics and motor drives, it had unlocked the opportunity of discovering the Higher Phase Order (HPO) motors and drives [1]. This Higher Phase Order inverter or known as multiphase inverter had its own advantages over the three-phase inverter that are reducing the low-order harmonic and produce output voltage waveform that is near to the sinusoidal waveform [3].

For multiphase inverter, it will use the output of voltage source inverter as the main source to operate. In order to control the VSI, a certain number of Pulse Width Modulation (PWM) techniques were used. Nonetheless, a new technique called the Space Vector Pulse Width Modulation (SVPWM) technique were introduced and was used rather than using the PWM technique. This is because SVPWM had the better DC bus utilization and the easiness of the digital implementation when compared to the PWM technique [2].