

Space Vector Pulse Width Modulation for Speed Control of Induction Motor

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Abstract— In this paper speed of induction motor is controlled By using three phase bridge inverter. In this paper the speed of an induction motor can be change by changing the input Voltage or frequency or both voltage and frequency. Variable voltage and variable frequency for induction motor Drives is obtained from a 3ϕ Voltage Source Inverter (VSI). Voltage and frequency of inverter can be easily controlled and applied by using PWM techniques, which is a very necessary main point in the application of induction motor drives. A number of PWM techniques are there to produce a variable voltage and variable frequency supply such as PWM, SPWM, SVPWM to name a few, among the above various strategies SVPWM is one of the most efficient and better techniques as it has better performance and output voltage is similar to sinusoidal. In SVPWM the modulation index in linear region will also be high when compared to other Modulation techniques, and DC link voltage use in space Vector PWM technique is 15% more as compared to Sinusoidal PWM.

Key words: Adjustable Speed Drive (ASD); Voltage Source Inverter (VSI), Space Vector PWM (SVPWM)

I. INTRODUCTION

Three phase voltage-fed PWM inverters are recently showing popularity for multi-megawatt industrial drive applications. In the lower power, GTO devices replaced by IGBTs because of their evolution in voltage and current ratings and higher switching frequency. The Space Vector Pulse Width Modulation of a three level inverter provides the advantage of improves harmonic quality and more under-modulation range that increase the modulation factor to 90.7% from the value of 78.5% in Sinusoidal Pulse Width Modulation.

An adjustable speed drive (ASD) is a device used to gives continuous range process speed control. An ASD is capable of adjusting both speed and torque from an induction or synchronous motor. An electric ASD is used to control motor speed. ASDs may be referred to by a variety of names as adjustable frequency drives or variable frequency inverters.

II. OBJECTIVES

- Using SVPWM technique improve the System performance.
- Smoothly Speed Control technique.

III. LITERATURE REVIEW

A. Bahman (2013)

In this paper Comparison between 9-level hybrid asymmetric and conventional multi-level inverters for medium voltage application. A hybrid asymmetric 2-cell 9-level inverter is analyzed and compared with two conventional multilevel

inverters: the 9-level cascaded H-bridge and the 3-level diode clamped inverter, when used to drive an induction motor of 4.16kV/500kVA. In this analysis, Total Harmonic Distortion (THD), First Order Distortion Factor (DF1), power semiconductor losses, and efficiency are selected as performance indexes.

B. Murali Krishna, (2012)

In this paper presented that THD Analysis of Symmetrical and Asymmetrical Cascaded H-Bridge Multilevel Inverters with PV Arrays. The non-conventional energy sources are used compared with conventional energy source because day by day the conventional energy sources are reduces. One of the most important types of PV installation is the grid connected inverter configurations.

IV. SVPWM

The SVPWM method considers this interaction of the phase and optimizes the harmonic content of the three phase isolated neutral load as shown in Figure. 1.

The three phase sinusoidal and balance voltages is obtain from figure.

$$V = 2/3[V_{An} + aV_{Bn} + a^2V_{Cn}]$$

Are applied to the three phase induction motor, . A three phase bridge inverter, From Figure.1, has 8 permissible switching states. voltage of isolated neutral machine.

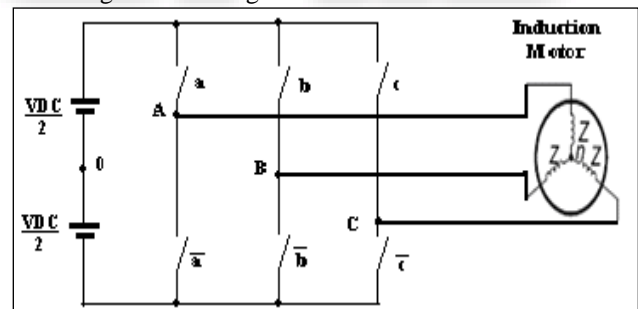


Fig. 1: Voltage source inverter type 3 phase

The energy that a PWM converter delivers to a motor is controlled by PWM signals applied to the gates of the power switches. Different PWM techniques are existing, that are Sinusoidal PWM, new Space-Vector PWM. These techniques are commonly used for the control of ac induction. As a result, PWM converter powered motor drives offer better efficiency and higher performance compared to fixed frequency motor.

A. Comparison between PWM & SVPWM

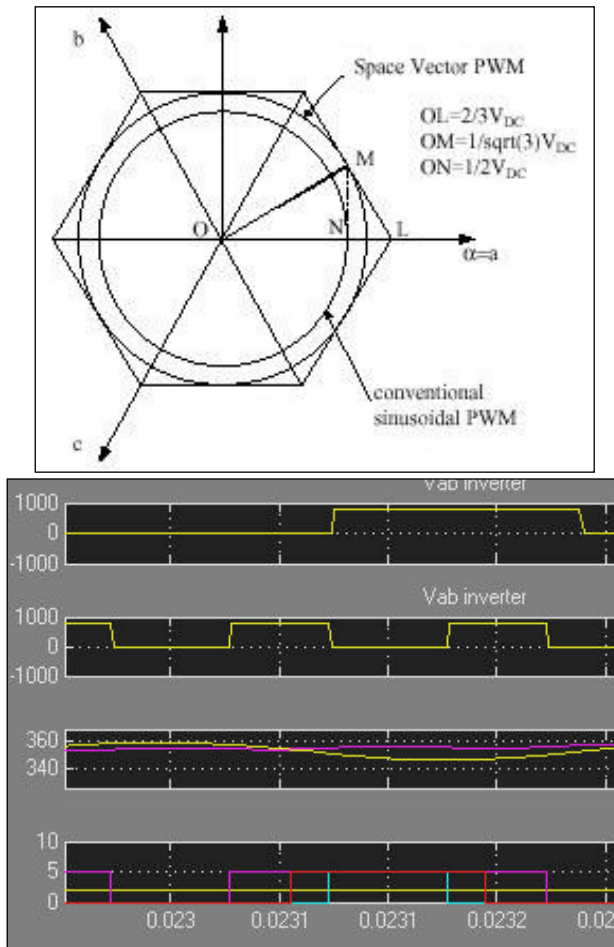


Fig. 2: Comparison between PWM & SVPWM

V. RESULT

From the figure 2 it is clear that SVM output contains less harmonic distortion compared to conventional PWM.

VI. CONCLUSION

As seen from above the SVPWM Technique is produce less harmonics and gives better response compare to other types of PWM techniques. Using this technique speed of induction motor is smoothly control.

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