



**SolarTech Power Solutions**

# **Inverter voltage vector**



## Overview

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How are inverter voltage space vectors determined?

On the basis of the general decoupling transformation matrix for an n-phase system, inverter voltage space vectors in the second two-dimensional subspace (x - y) are determined with Eq. (14.92): Thus, 32 space vectors of phase-to-neutral voltage in the x - y plane are obtained using Eq. (14.92) and are demonstrated in Fig. 14.33.

What are the output voltages of an inverter?

As shown below,  $V_a$ ,  $V_b$  and  $V_c$  are the output voltages of the inverter. Q1 through Q6 are the six power transistors that shape the output, which are controlled by  $a$ ,  $a'$ ,  $b$ ,  $b'$ ,  $c$  and  $c'$ . When an upper transistor is switched on (i.e., when  $a$ ,  $b$  or  $c$  is 1), the corresponding lower transistor is switched off (i.e., the corresponding  $a'$ ,  $b'$  or  $c'$  is 0).

What is space vector modulation (SVM)?

Space Vector Modulation (SVM) was originally developed as vector approach to Pulse Width Modulation (PWM) for three phase inverters. It is a more sophisticated technique for generating sine wave that provides a higher voltage to the motor with lower total harmonic distortion.

How does a 3 phase inverter work?

Three-phase inverter circuit connected to the stator windings of a motor. The switching states that correspond to the basic space vectors (for direction) and the null vectors (for magnitude) are combined to approximate a voltage vector of any magnitude, at any position, within the space vector hexagon.

How many switching states can a two-level inverter have?

The space vector modulation technique for two-level inverters can be generalized to three levels. A three-level converter has three possible switching states per leg, denoted P (positive output voltage), N (negative

output), and 0 (zero output). In total, the converter has 27 possible switching states.

Why is space vector PWM better than sine PWM?

Hence, to obtain good voltage transfer and reduced distortion space vector PWM is required. Space vector PWM can produce about 15% higher output voltage than sine PWM. The simulation study reveals that Space vector PWM utilizes dc bus voltage more effectively and generates less THD when compared with sine PWM.

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