Space Vector Modulation

3 phase Inverter Equations

$$V_a = \frac{V_{dc}}{3}(2S_1 - S_2 - S_3) \qquad V_b = \frac{V_{dc}}{3}(2S_2 - S_1 - S_3) \qquad V_c = \frac{V_{dc}}{3}(2S_3 - S_2 - S_1)$$

Conversion from 3 phase to 2 phase

$$\begin{bmatrix} V_\alpha \\ V_\beta \end{bmatrix} = \begin{bmatrix} 1 & \frac{-1}{2} & \frac{-1}{2} \\ 0 & \frac{\sqrt{3}}{2} & \frac{-\sqrt{3}}{2} \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix}$$

$$\alpha = \tan^{-1}\left(\frac{V_\beta}{V_\alpha}\right)$$

$$V_r = \sqrt{(V_\alpha)^2 + (V_\beta)^2}$$

Time Computation Formula

$$T_a = \frac{2\,T_{period}}{\sqrt{3}\,V_{dc}} V_r \sin\left(\frac{K \times \pi}{3} - \alpha\right)$$

$$T_b = \frac{2\,T_{period}}{\sqrt{3}\,V_{dc}} V_r sin\left(\alpha - \frac{(K-1) \times \pi}{3}\right)$$

$$T_0 = T_{period} - T_a - T_b$$

K : Sector Number

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$$mi = \frac{V_{r,phase}}{0.636\,V_{dc}}$$

Switching Time Table

Section	T_{s1}	T_{s2}	S_3
Section 1	$T_{period} - \frac{T_0}{2}$	$\frac{T_0}{2} + T_2$	$\frac{T_0}{2}$
Section 2	$\frac{T_0}{2} + T_1$	$T_{period} - \frac{T_0}{2}$	$\frac{T_0}{2}$
Section 3	$\frac{T_0}{2}$	$T_{period} - \frac{T_0}{2}$	$\frac{T_0}{2} + T_2$
Section 4	$\frac{T_0}{2}$	$\frac{T_0}{2} + T_1$	$T_{period} - \frac{T_0}{2}$
Section 5	$\frac{T_0}{2} + T_2$	$\frac{T_0}{2}$	$T_{period} - \frac{T_0}{2}$
Section 6	$T_{period} - \frac{T_0}{2}$	$\frac{T_0}{2}$	$\frac{T_0}{2} + T_1$