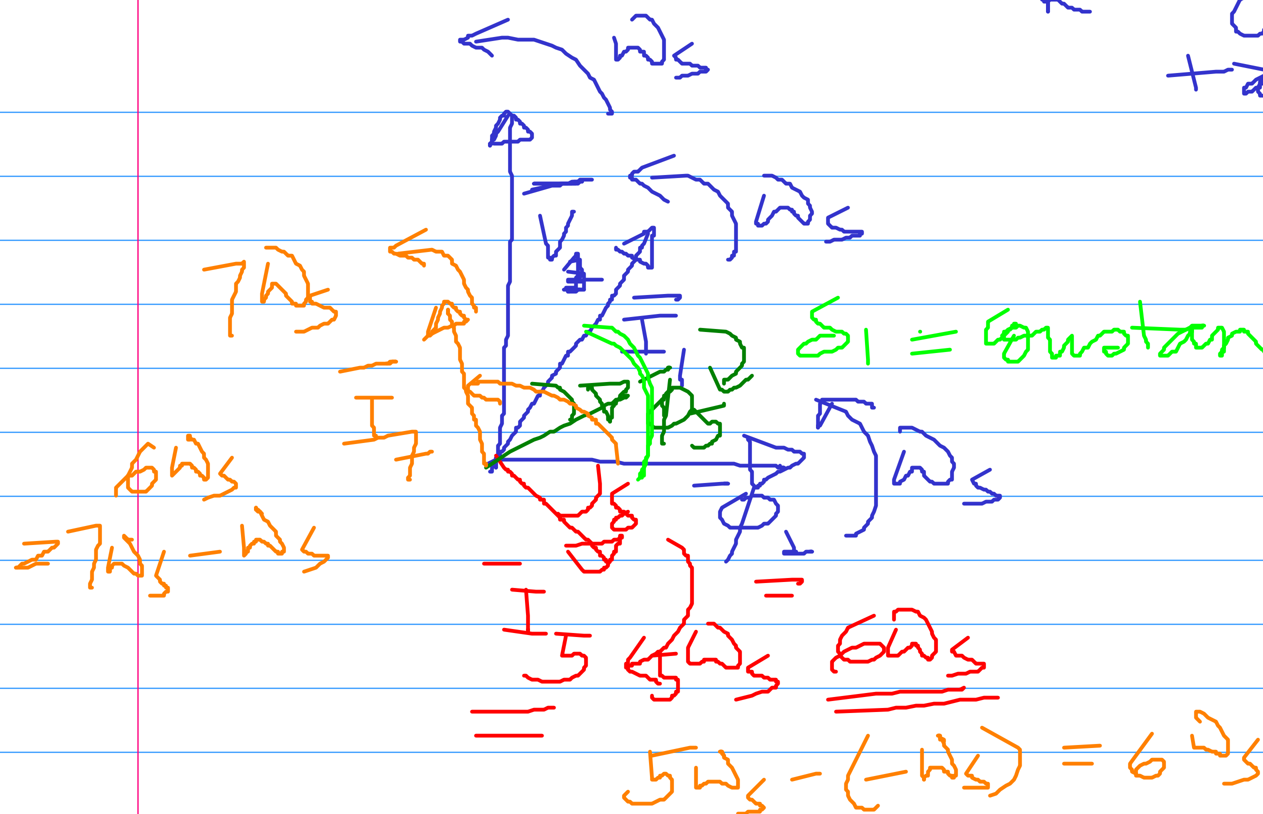
$$\bar{X} = x_R + x_Y e^{j2\pi/3} + x_B e^{-j2\pi/3}$$



$$v_p(t) = m \frac{V_{dc}}{2} \sin(\omega_s t + \phi)$$

(Phase with respect to neutral) + DC bus + All harmonics of higher order (Bessel Function)

Frequency components of the Bessel Function

$M\omega_c \pm N\omega_s$ where $M + N \Rightarrow$ odd

M, N are integers

ω_c : Carrier freq. $\underline{M\omega_c \pm N\omega_s} \times$

ω_s : supply frequency $\frac{\omega_c}{\omega_s} = P$

$P \geq 15$, multiple of $\frac{\omega_s}{3}$

$P = 15$

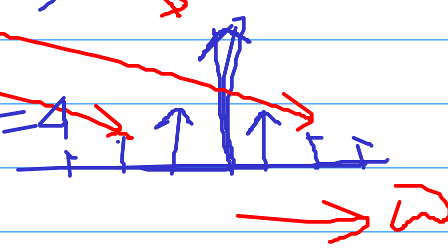
m = modulation index $= \dfrac{V_m}{V_T}$

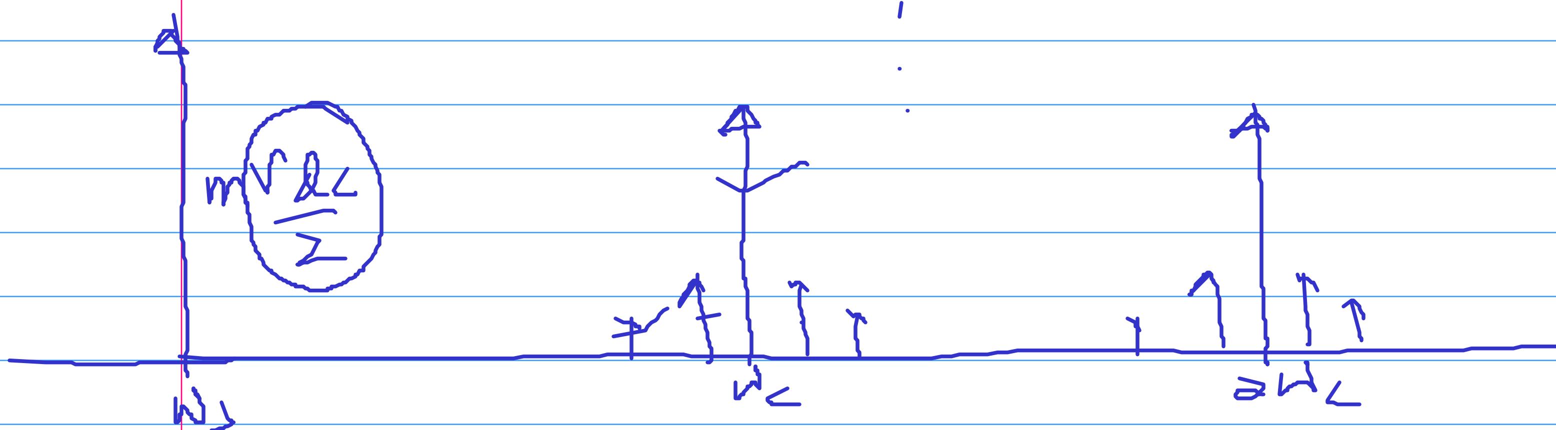
where V_m = ~~Magnitude~~ Peak of the modulating wave (sine)

V_T = ~~Mag~~ Peak of the carrier wave (triangle)

$P = 15$

M		
1	$15\omega_s$	$\rightarrow N = 0$
	$15\omega_s \pm 2\omega_s$	$\rightarrow N = 2$
	$15\omega_s \pm 4\omega_s$	$\rightarrow N = 4$
2	$2\omega_c \pm \omega_s$	$N = 1$
	$2\omega_c \pm 3\omega_s$	
	$\vdots$	

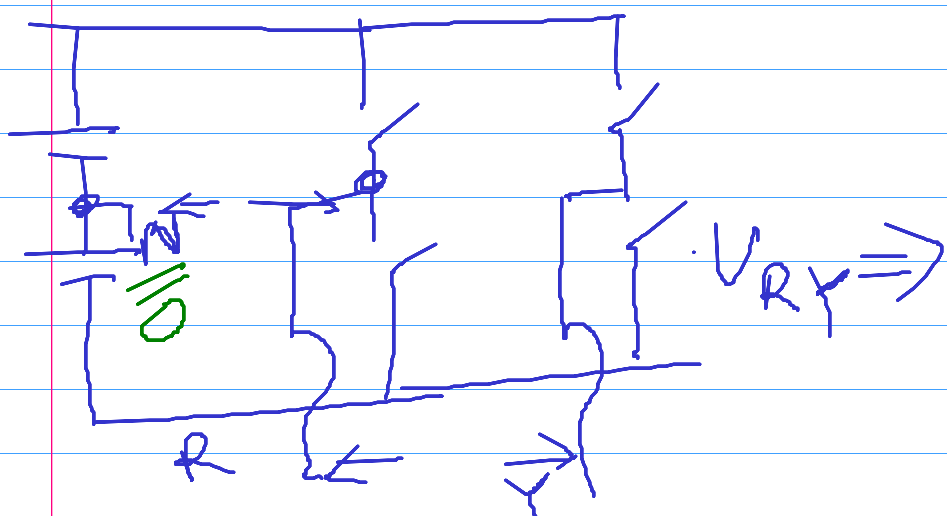


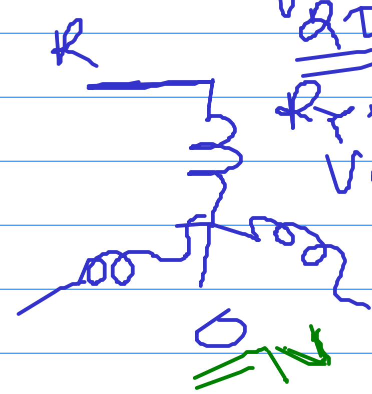


V_1 (square wave operation) $= \frac{4}{\pi}\frac{V_{dc}}{2}$

V_1 (sine-triangle modulation) $= \frac{V_{dc}}{2}$

$\frac{\pi}{4} = .78$



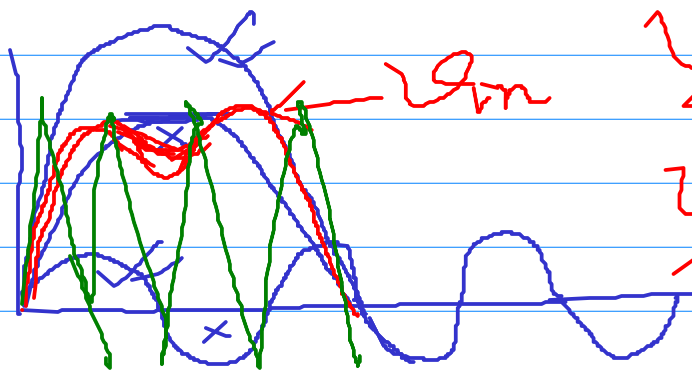


$\frac{V_{aD}}{}$

$R_{YD} = 0$

$V_{3D} = 0$

$V_T \Leftarrow 1$



v_m (peak) < 1

$v_{m1} < 1$

$v_m = v_{m1} + v_{m3}$

Space Vector Modulation (SVM)

$$v_{Rn} = V_m \sin \omega_s t$$

$n \Rightarrow$ Motor Neutral

$$v_{Yn} = V_m \sin(\omega_s t - 120^\circ)$$

$$v_{Bn} = V_m \sin(\omega_s t + 120^\circ)$$

$$\bar{V}_M = v_{Rn} + v_{Yn}\, e^{j2\pi/3} + v_{Bn}\, e^{-j2\pi/3}$$

$$= V_m \sin \omega_s t + V_m \sin(\omega_s t - 120^\circ)\left[-\tfrac{1}{2} + j\tfrac{\sqrt{3}}{2}\right] + V_m \sin(\omega_s t + 120^\circ)\left[-\tfrac{1}{2} - j\tfrac{\sqrt{3}}{2}\right]$$

$$= \left[\tfrac{3}{2}\sin \omega_s t - j\,\tfrac{3}{2}\cos \omega_s t\right] V_m$$

$$|\bar{V}_m| = \tfrac{3}{2} V_m$$

$\omega_s T = 2\pi$

$T = \dfrac{2\pi}{\omega_s}$