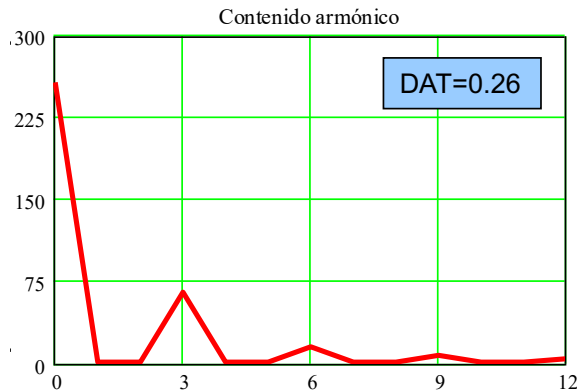
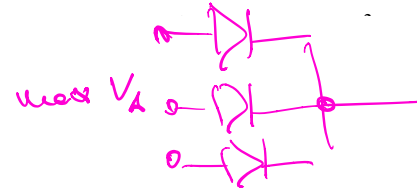
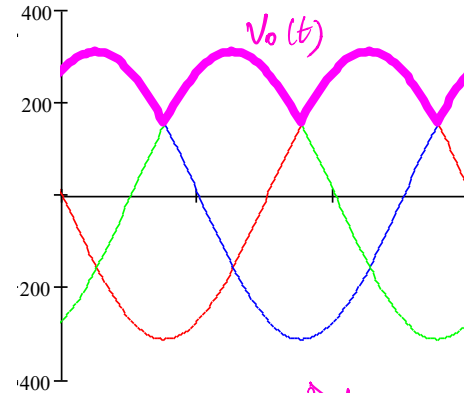
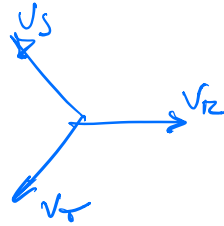
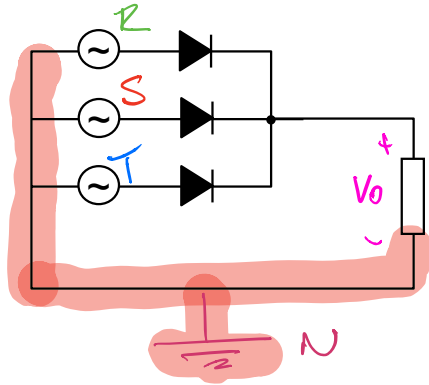
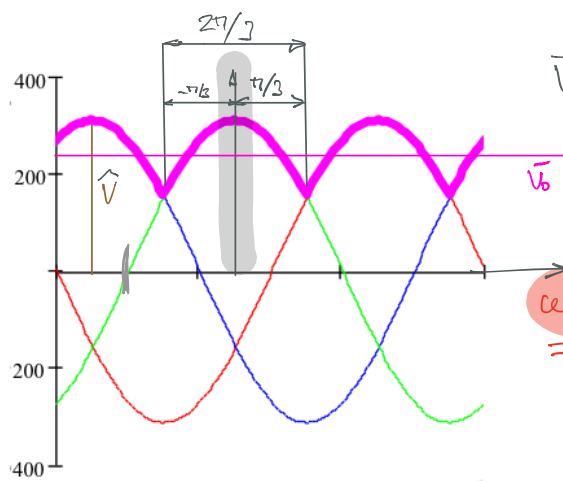


RECTIFICADOR DE MEDIA ONDA



$$DAT = \frac{\sqrt{\sum I_i^2}}{I_{dc}}$$

Cálculo de \bar{V}_0



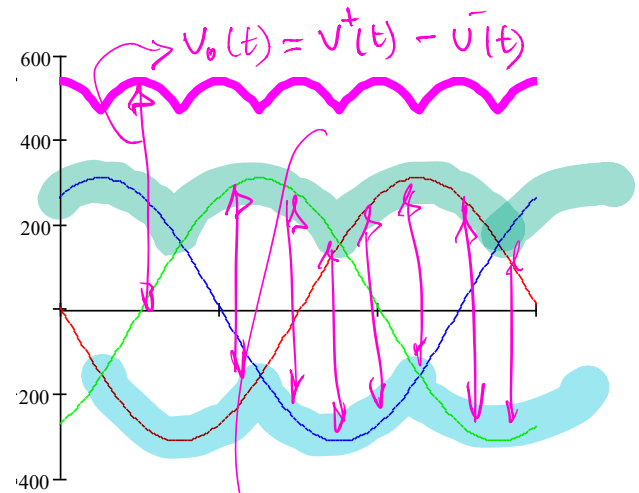
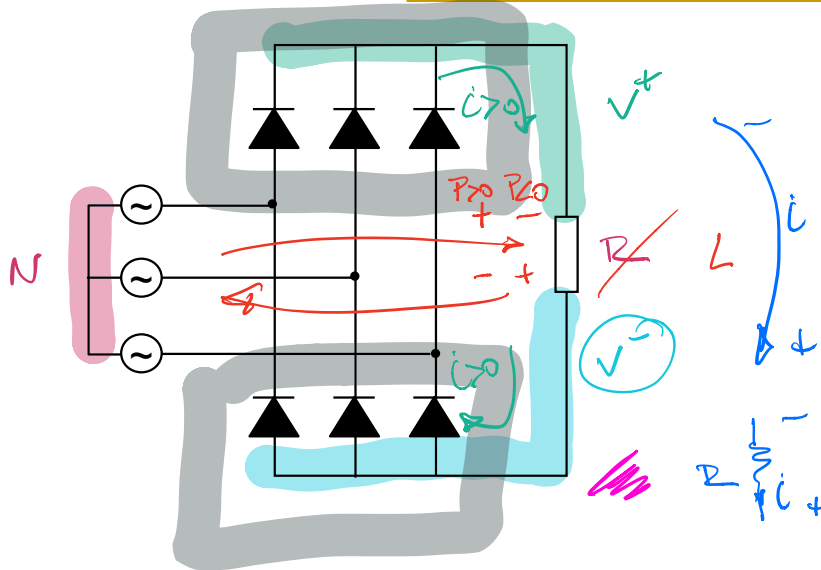
$$\bar{V}_0 = \frac{1}{2\pi/3} \int_{-\pi/3}^{\pi/3} \hat{V} \cdot \cos \omega t \, d\omega t = \hat{V} \cdot \frac{3}{2\pi} \cdot \left[\sin \omega t \right]_{-\pi/3}^{\pi/3}$$

$$\bar{V}_0 = \hat{V} \cdot \frac{3}{\pi} \cdot \sin \frac{\pi}{3}$$

Para índice de pulsación "P"

$$\bar{V}_0 = \hat{V} \cdot \frac{P}{\pi} \cdot \sin \frac{\pi}{P}$$

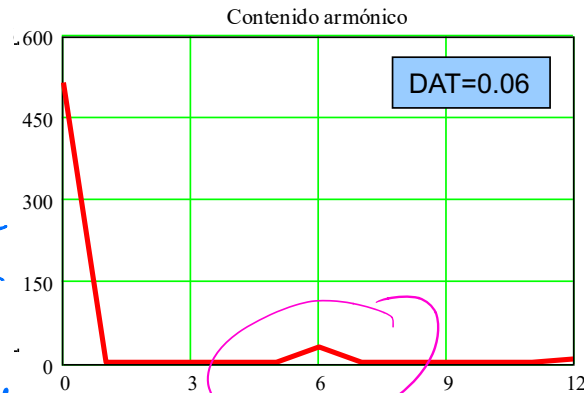
RECTIFICADOR DE DOBLE ONDA



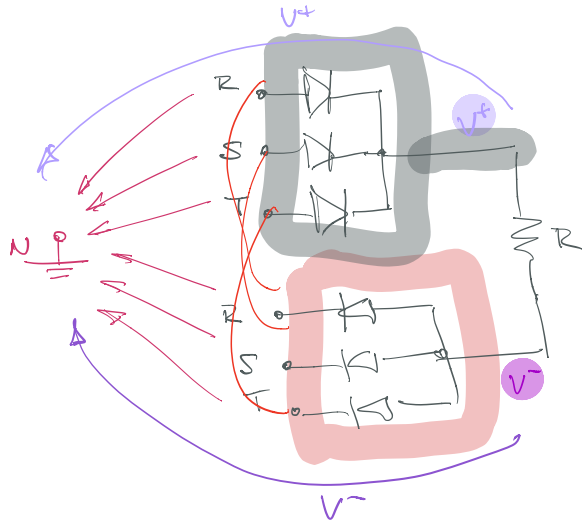
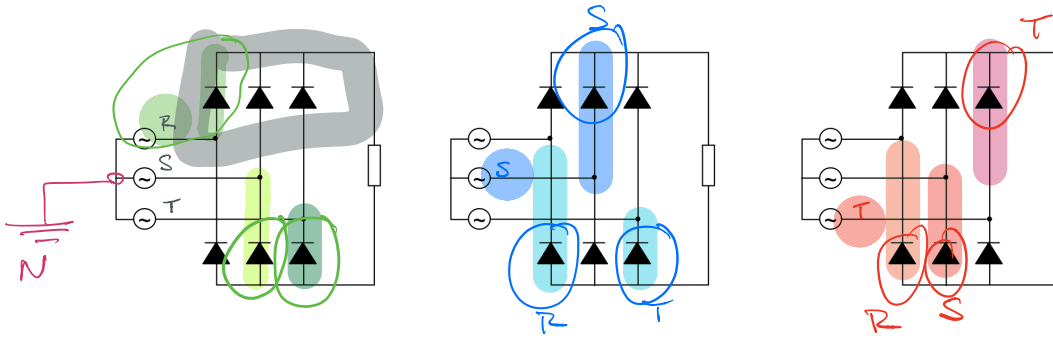
$$P = 6$$

$$\hat{V}_L = \sqrt{3} \hat{V}_{FW}$$

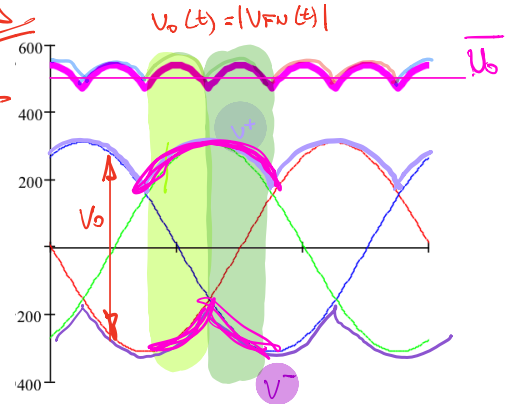
$$\Delta V_{FW} < \Delta V_{uwo}$$



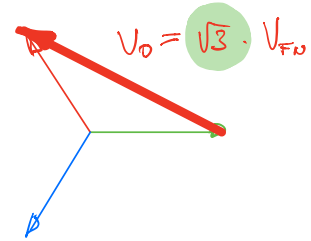
- Conducción / Corte de los Int. Potencia
- FP, THD, Desfase de i, v en la red.



~~LINEAR~~
 $V_o(t)$



$$V_o(t) = V^+(t) - V^-(t)$$

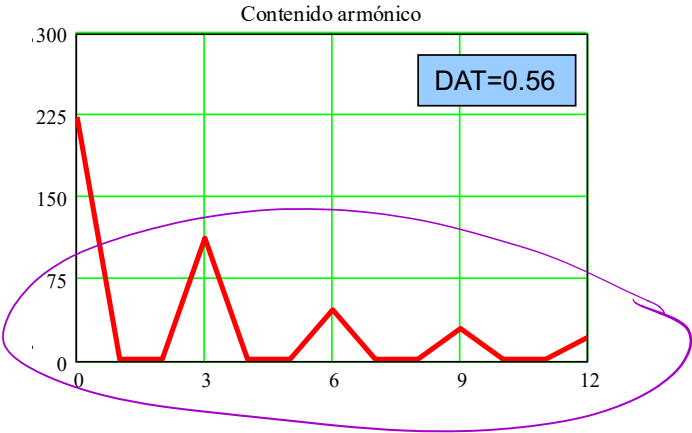
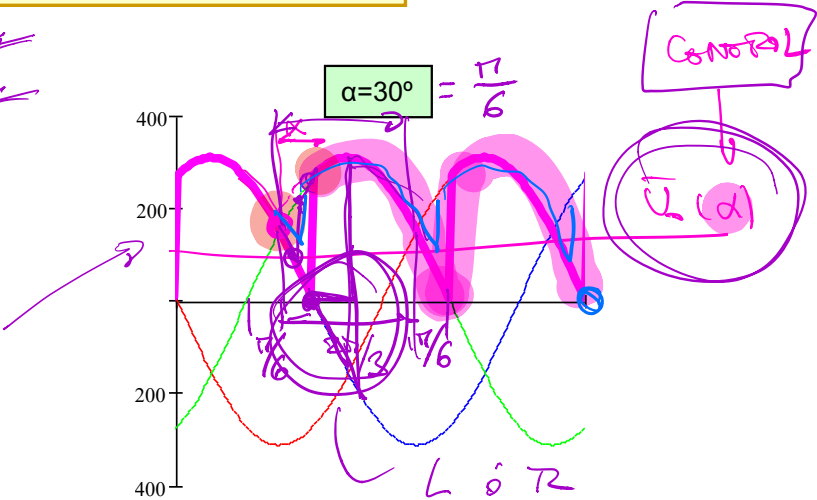
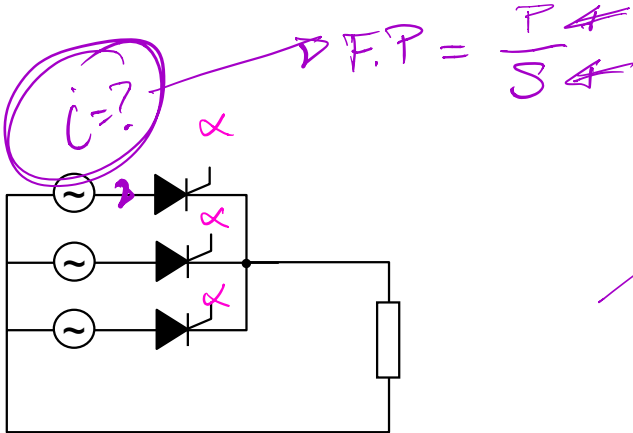


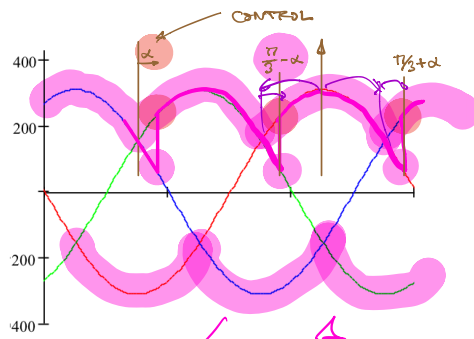
$$\overline{V_o} = \sqrt{3} \cdot \hat{V}_{FN} \cdot \frac{6}{\pi} \cdot \sin \frac{\pi}{6}$$

$$\overline{V_o} = \hat{V} \cdot \frac{P}{\pi} \cdot \sin \frac{\pi}{P}$$

$P=6$

RECTIFICADOR DE MEDIA ONDA CONTROLADO





$$\bar{V}_0 = \frac{1}{2\pi} \int_{\frac{\pi}{3} + \alpha}^{\frac{\pi}{3} + \alpha} \hat{V} \cdot \cos \omega t \, d\omega t$$

$$\bar{V}_0 = \frac{3}{2\pi} \cdot \hat{V} \cdot \left[\sin \omega t \right]_{\frac{\pi}{3} + \alpha}^{\frac{\pi}{3} + \alpha} = \frac{3}{2\pi} \cdot \hat{V} \cdot 2 \cdot \sin \frac{\pi}{3} \cos \alpha$$

$$\bar{V}_0 = \hat{V} \cdot \frac{3}{\pi} \cdot \sin \frac{\pi}{3} \cdot \cos \alpha$$

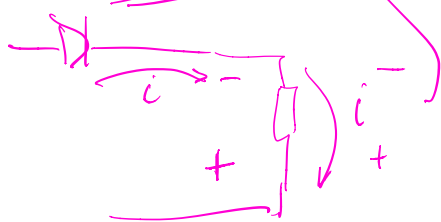
$\alpha = 0 \Rightarrow 1$
 $\alpha = \frac{\pi}{2} \Rightarrow 0$
 $\alpha = \pi \Rightarrow -1$

$p = 3$

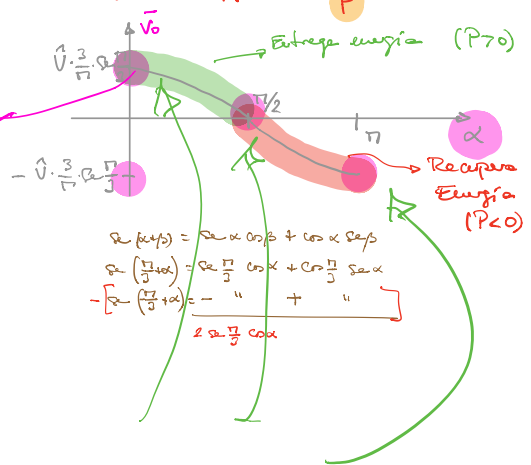
$$\bar{V}_0 = \hat{V} \cdot \frac{p}{\pi} \cdot \sin \frac{\pi}{p} \cdot \cos \alpha$$

$\bar{V}_0 < 0!!$

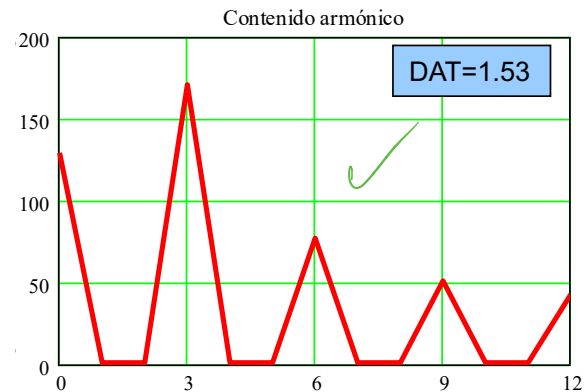
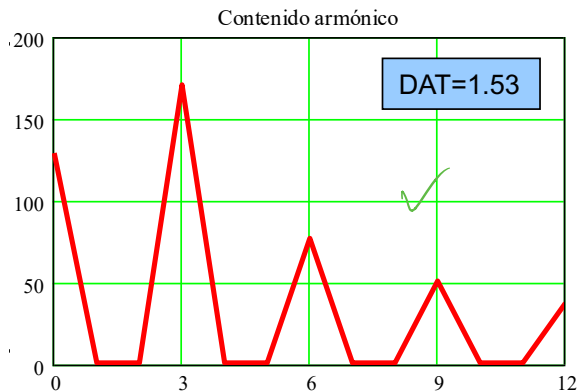
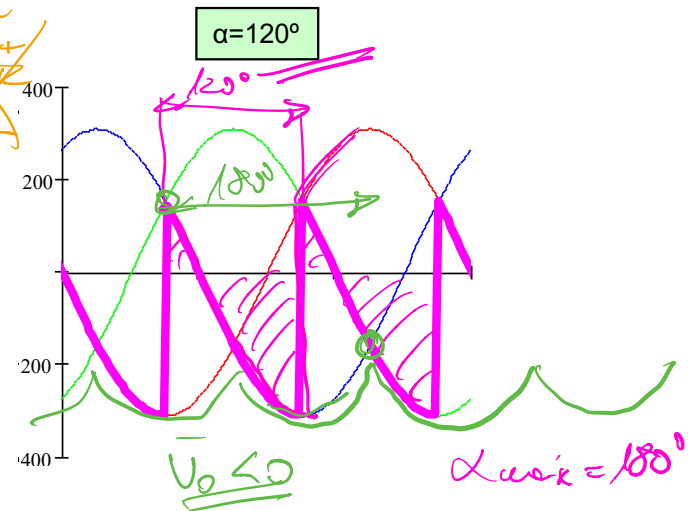
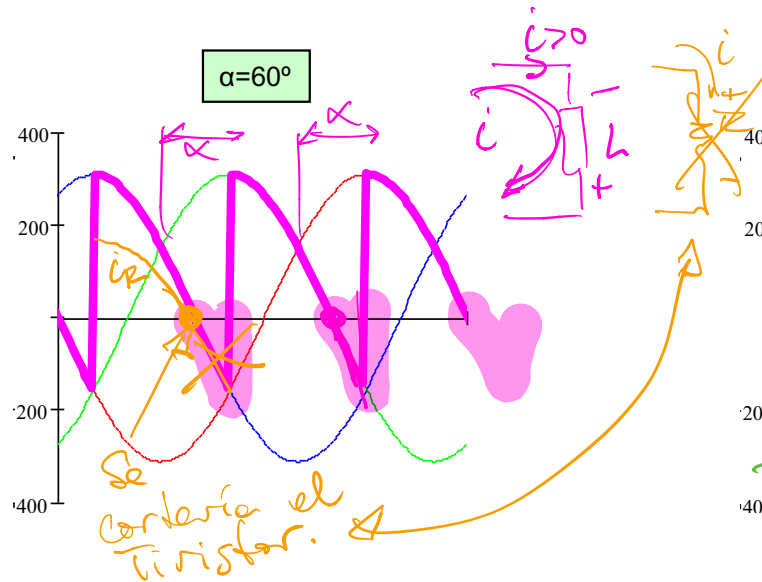
$i > 0$



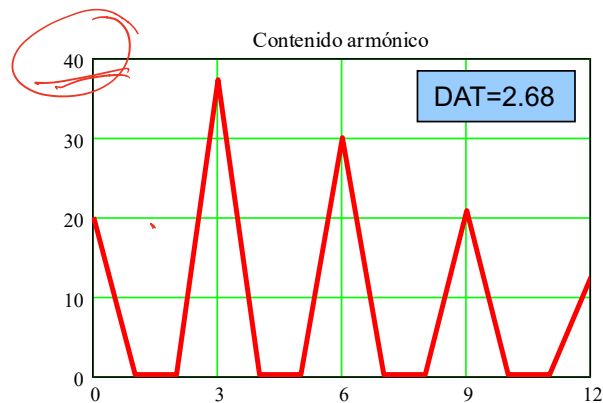
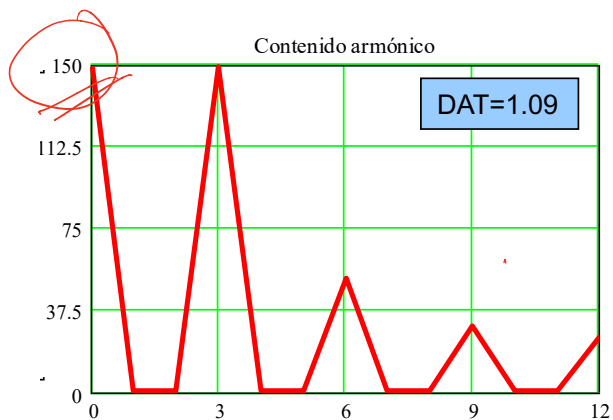
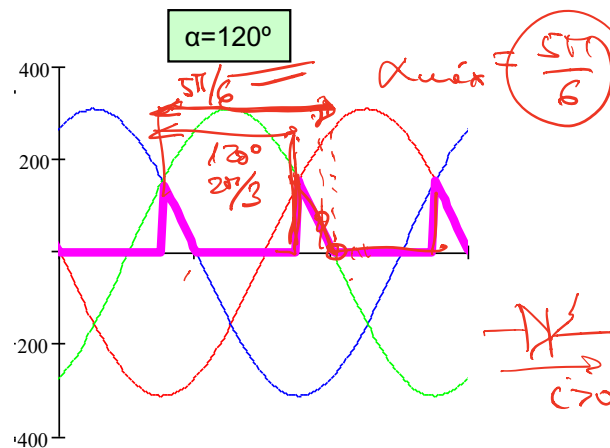
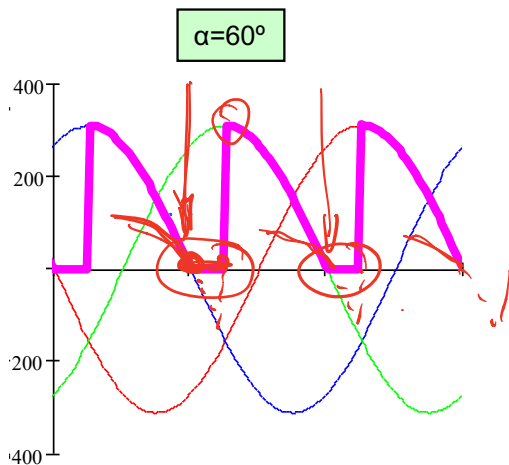
Rectif
No Control

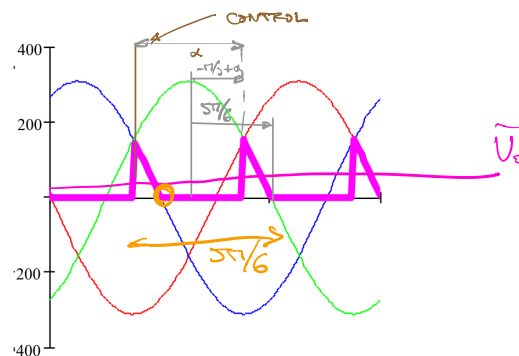
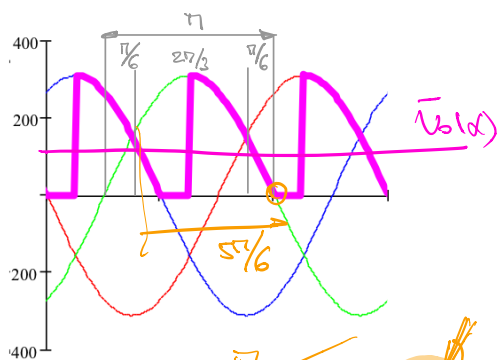


RECTIFICADOR DE MEDIA ONDA CONTROLADO CARGA INDUCTIVA



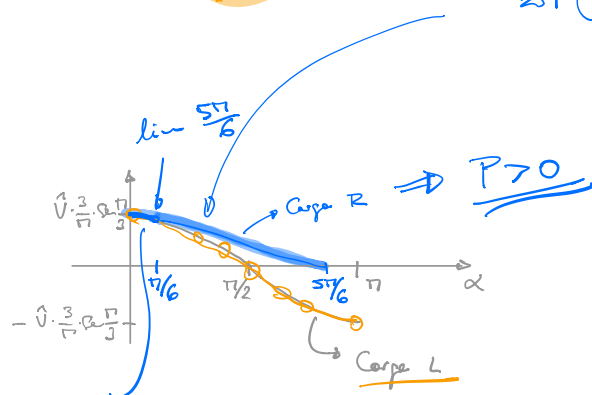
RECTIFICADOR DE MEDIA ONDA CONTROLADO CARGA RESISTIVA





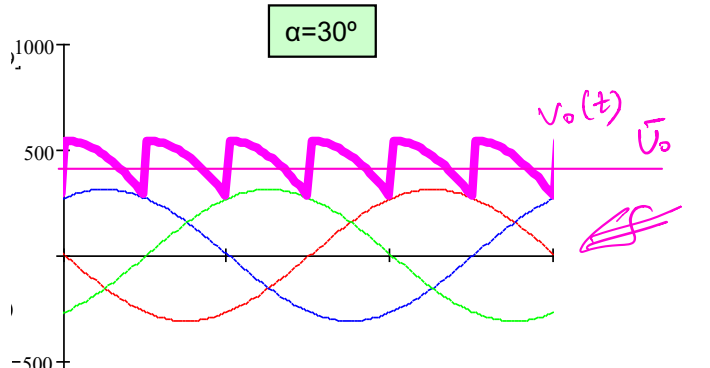
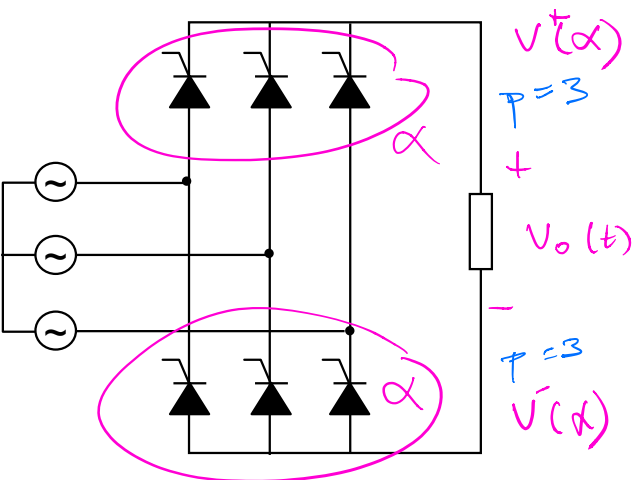
$$\bar{V}_o = \frac{1}{2\pi/3} \int_{-\pi/3+\alpha}^{5\pi/6} \hat{V} \cdot \cos \omega t \, d\omega t = \frac{3}{2\pi} \cdot \hat{V} \cdot \left[\sin \omega t \right]_{-\pi/3+\alpha}^{5\pi/6}$$

$$= \hat{V} \cdot \frac{3}{2\pi} \left[\sin \frac{5\pi}{6} - \sin \left(\frac{\pi}{3} + \alpha \right) \right]$$



$\alpha < \frac{\pi}{6}$
 égal que la
 inductive.

RECTIFICADOR DE DOBLE ONDA CONTROLADO

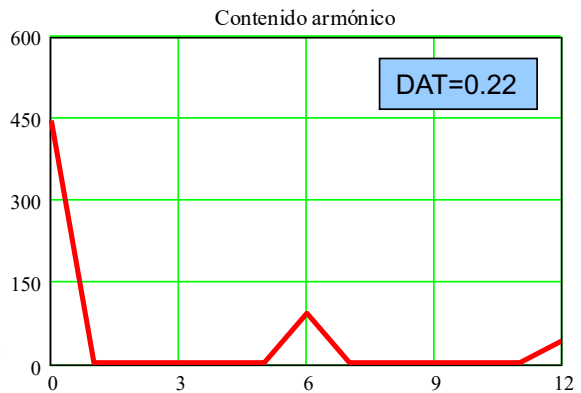


$\bar{V}_o = V^+ - V^-$

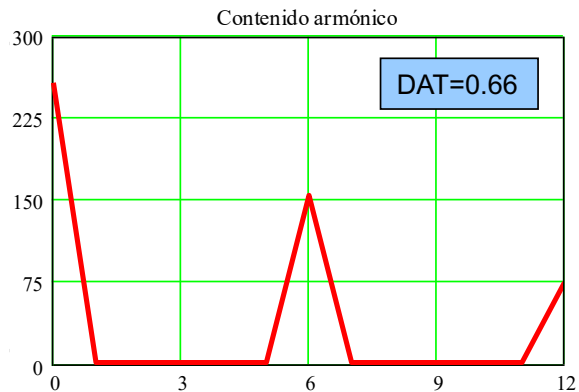
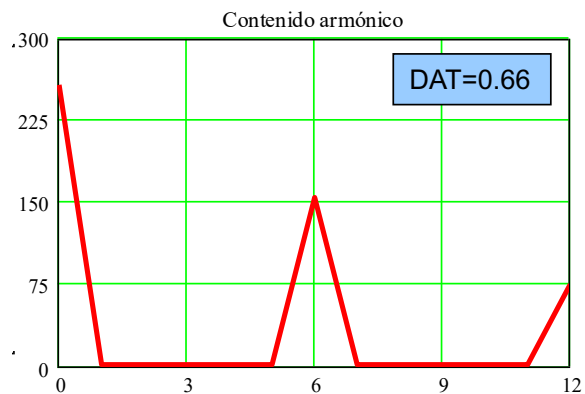
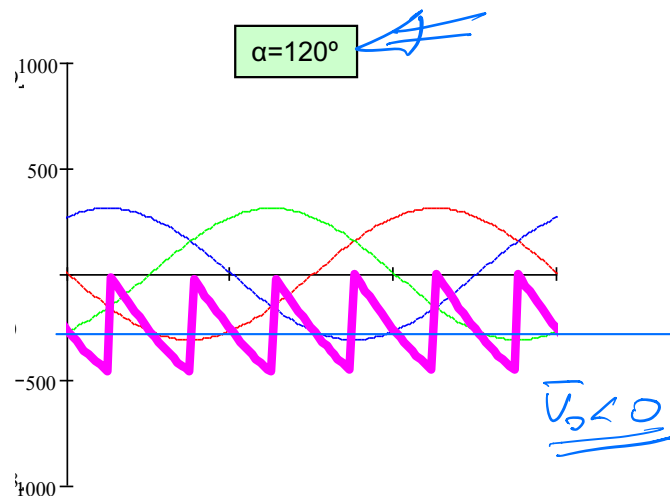
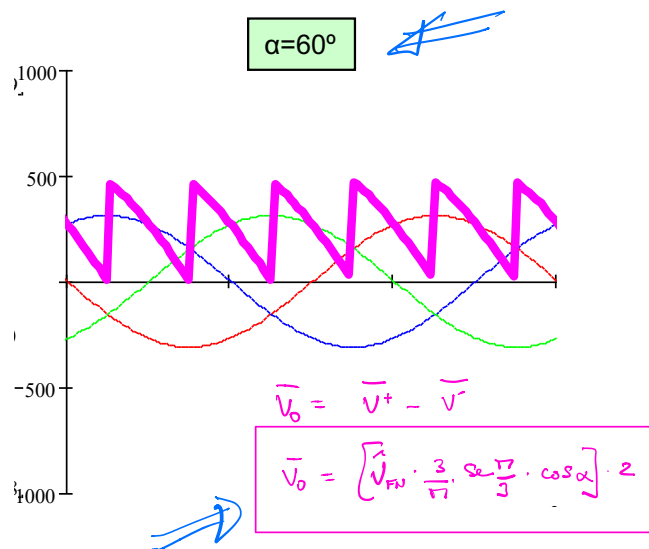
$$\bar{V}_o = \left[\frac{1}{\pi} \int_{\pi-\alpha}^{\pi} V_m \sin \omega t d\omega - \frac{1}{\pi} \int_{\pi}^{2\pi-\alpha} V_m \sin \omega t d\omega \right] \cdot 2$$

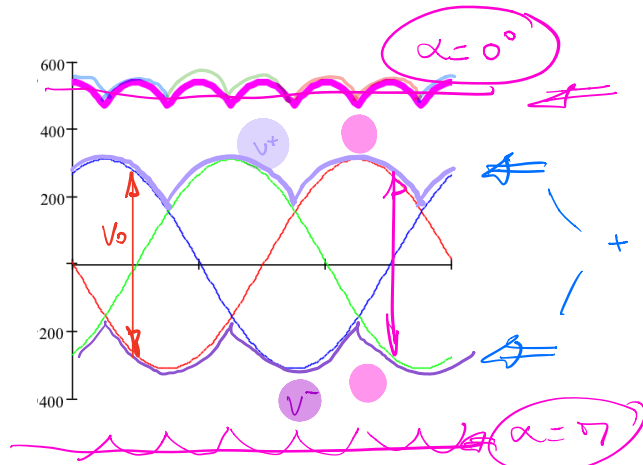
$p=3$

$\bar{V}_o^+ = -\bar{V}_o^-$

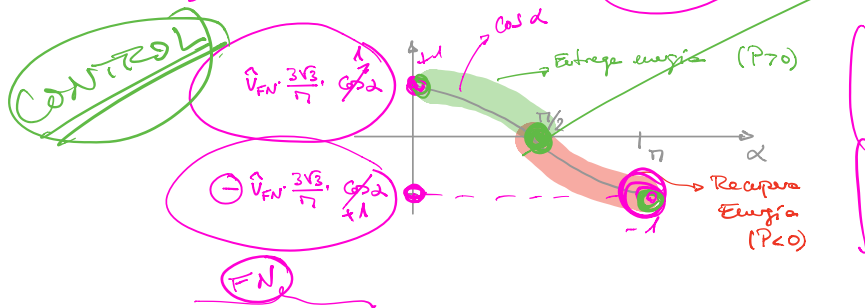


RECTIFICADOR DE DOBLE ONDA CONTROLADO CARGA INDUCTIVA





$$\frac{P=0}{U \neq 0} \Rightarrow \underline{\underline{S \neq 0}}$$



$$0 \leq \alpha \leq \pi$$

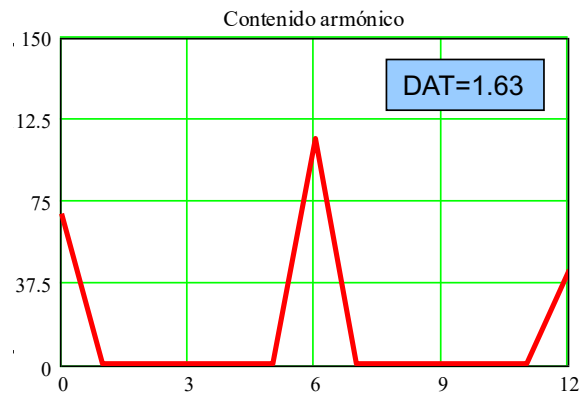
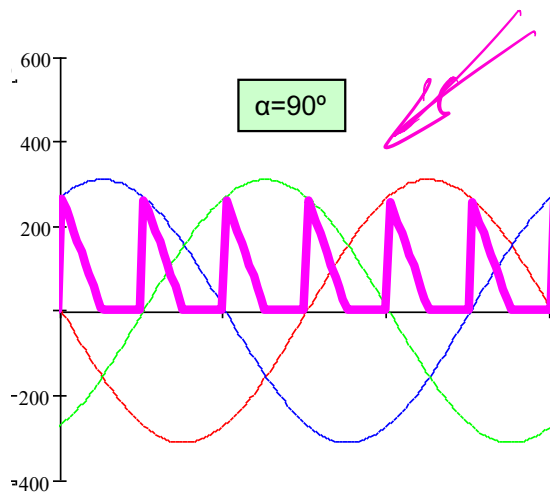
No Controlado

max \sqrt{L}

$$\bar{V}_0 = \left[\hat{V}_{FN} \cdot \frac{3}{\pi} \cdot \sin \frac{\pi}{3} \cdot \cos \alpha \right] \cdot 2 = 2 \cdot \hat{V}_{FN} \cdot \frac{3}{\pi} \cdot \frac{\sqrt{3}}{2} \cdot \cos \alpha = \hat{V}_{FN} \cdot \frac{3\sqrt{3}}{\pi} \cdot \cos \alpha$$

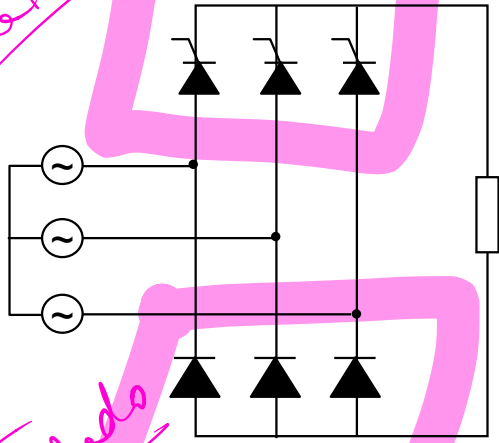
$$\begin{aligned} \bar{V}_0 &= \hat{V} \cdot \frac{3}{\pi} \cdot \sin \frac{\pi}{3} \cdot \cos \alpha \\ &= \sqrt{3} \hat{V}_{FN} \cdot \frac{6}{\pi} \cdot \sin \frac{\pi}{6} \cdot \cos \alpha \\ &= \hat{V}_{FN} \cdot \frac{3\sqrt{3}}{\pi} \cdot \cos \alpha \end{aligned}$$

RECTIFICADOR DE DOBLE ONDA CONTROLADO CARGA RESISTIVA



RECTIFICADOR SEMICONTROLADO

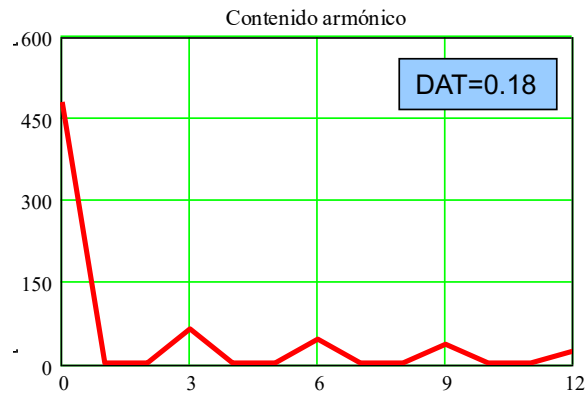
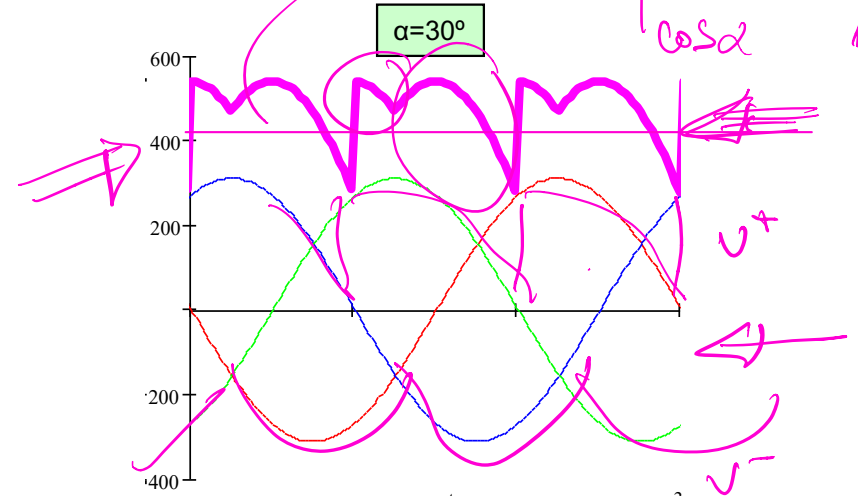
Controlado



No Controlado

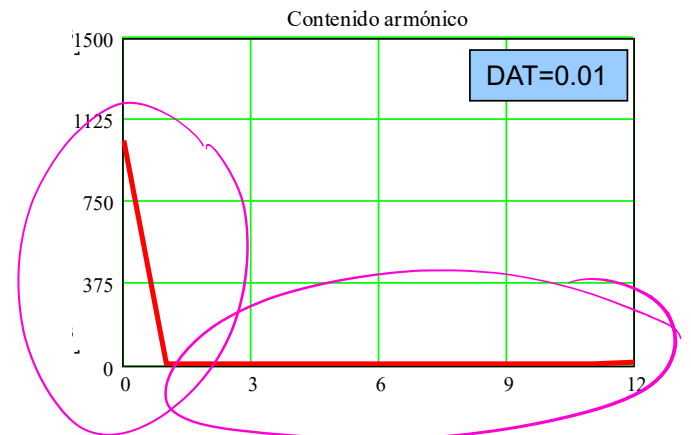
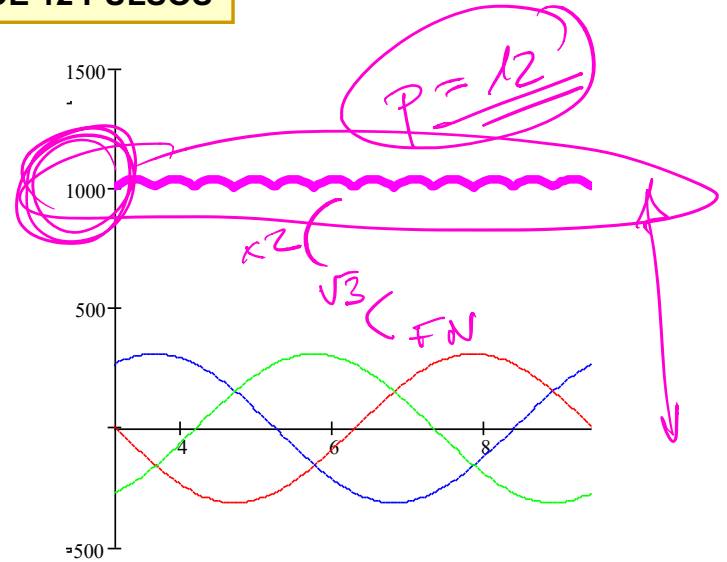
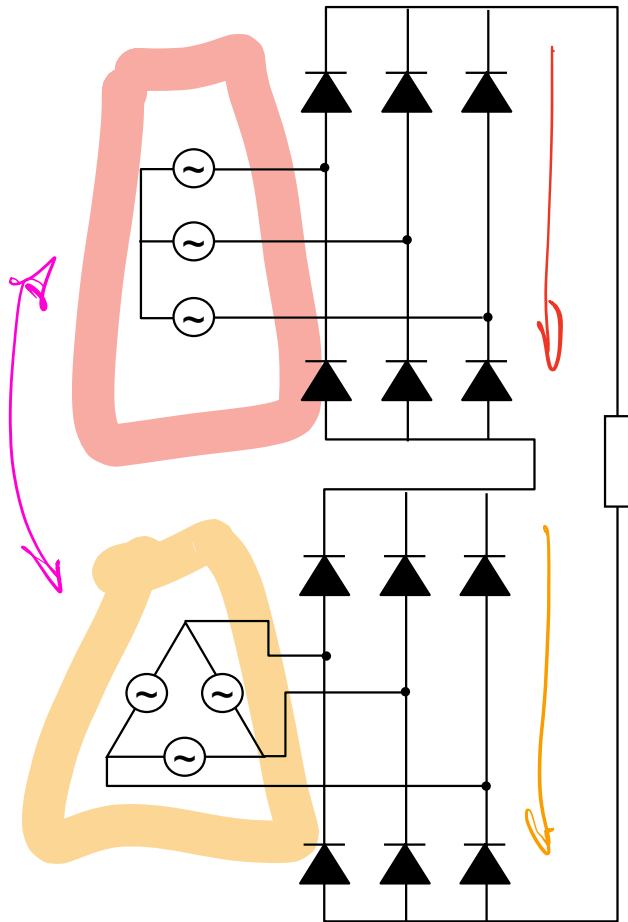
$$\overline{V_o} = \overline{V^+} - \overline{V^-}$$

\uparrow $\cos \alpha$



6

RECTIFICADOR DE 12 PULSOS



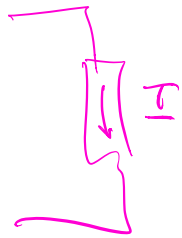
HW / FW

No contr. / Controlled

$\bar{V}_0(x)$

\bar{I} disposition

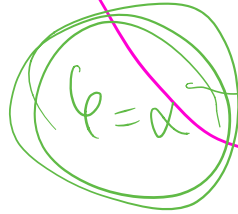
$\bar{I}_{red} \Rightarrow$ P.F.P., THD



$x=0$



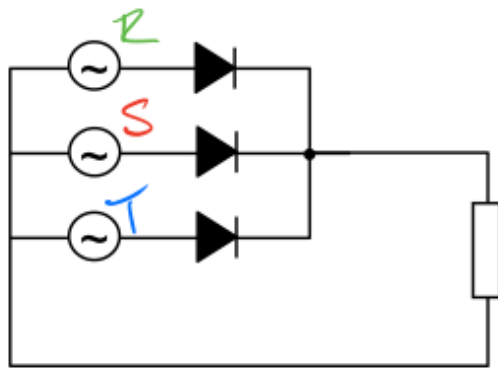
$\phi=0$



$\phi=\alpha$



P.F.P., THD



Carga $R=100\Omega$



Carga 10kW,
muy inductiva



Carga 10kW
Muy capacitiva



- a) i_{diodos} , V_{diodos}
- b) Factor de potencia
- c) THD

Para una inductancia de línea distinta de cero:

- d) visualizar su efecto en la inductancia por los diodos
- e) calcular su impacto en P_o

Imp