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Estudio de Rectificadores Trifásicos

14.- Acoplamientos: S3 en paralelo con PD3 (1T)

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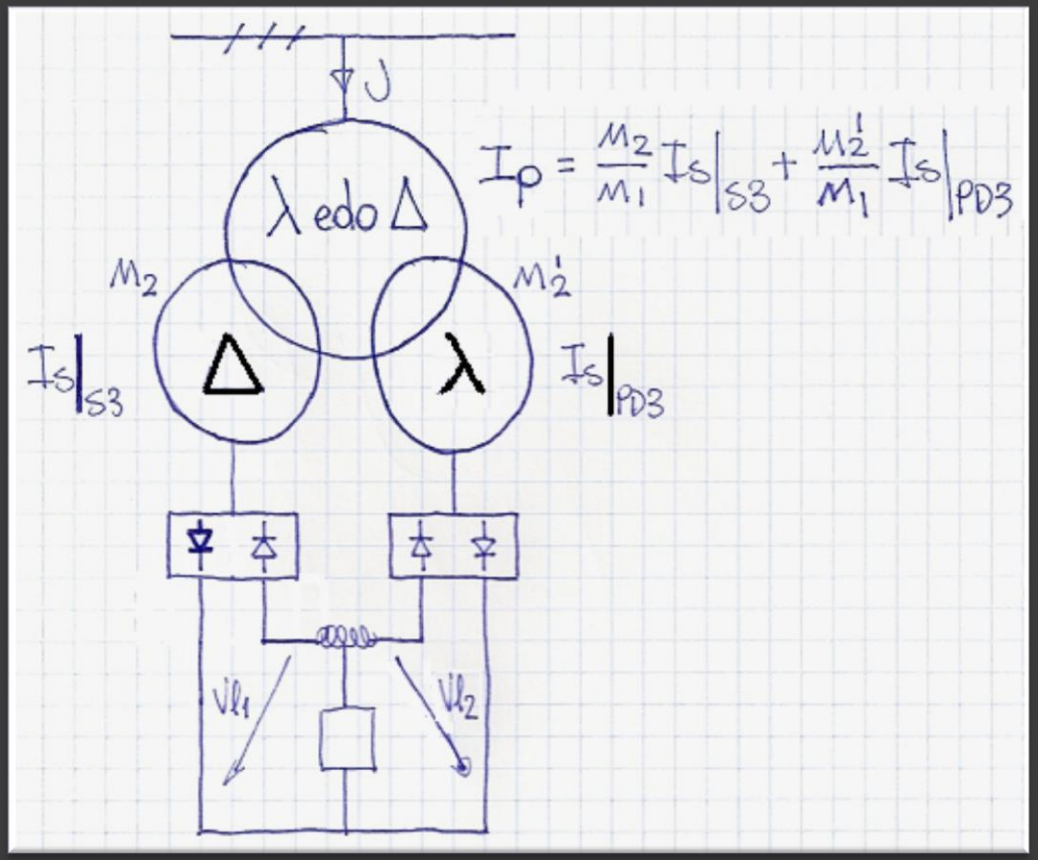
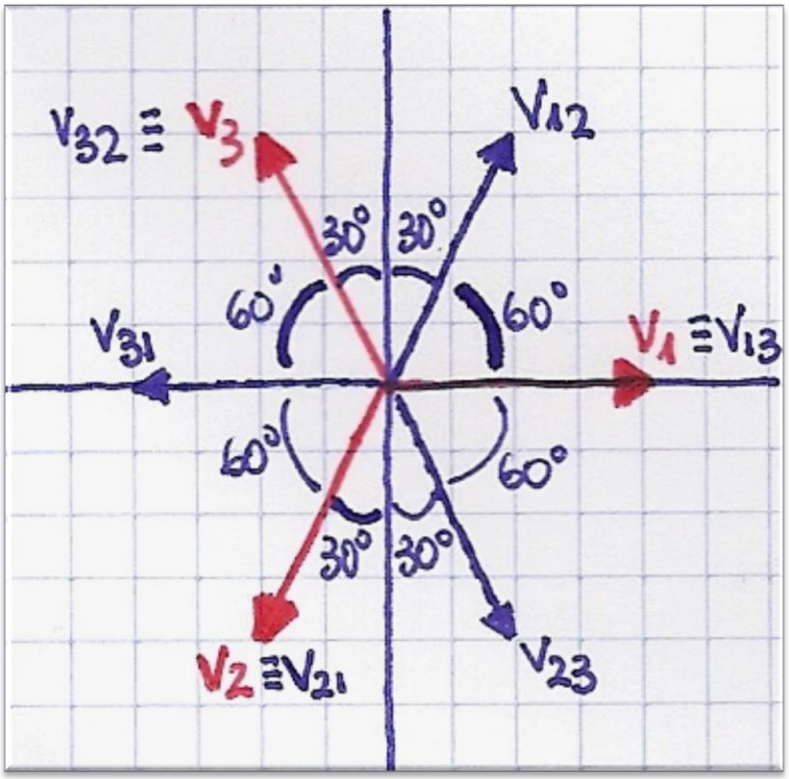
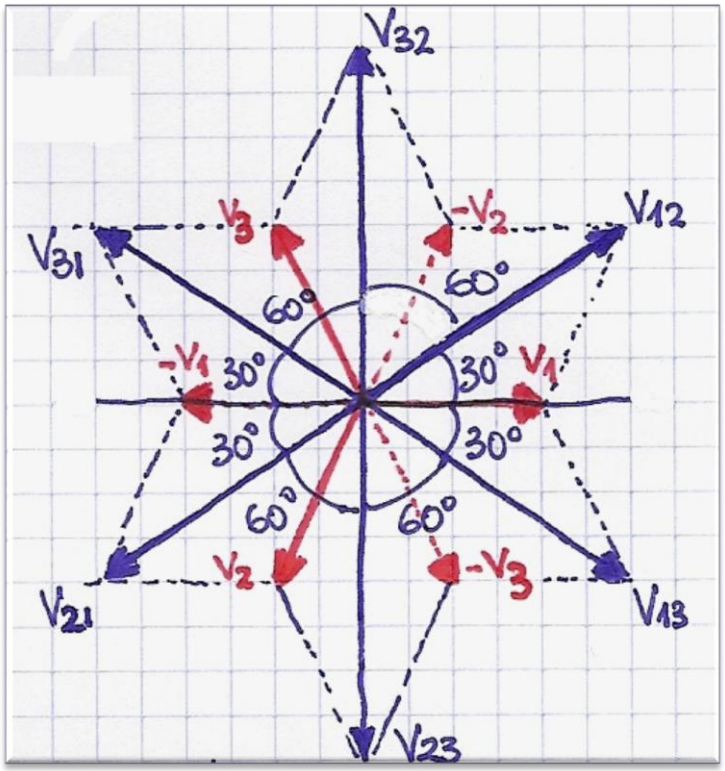
Acoplamientos: S3 || PD3 (1T)



Acoplamientos: S3 || PD3 (1T)



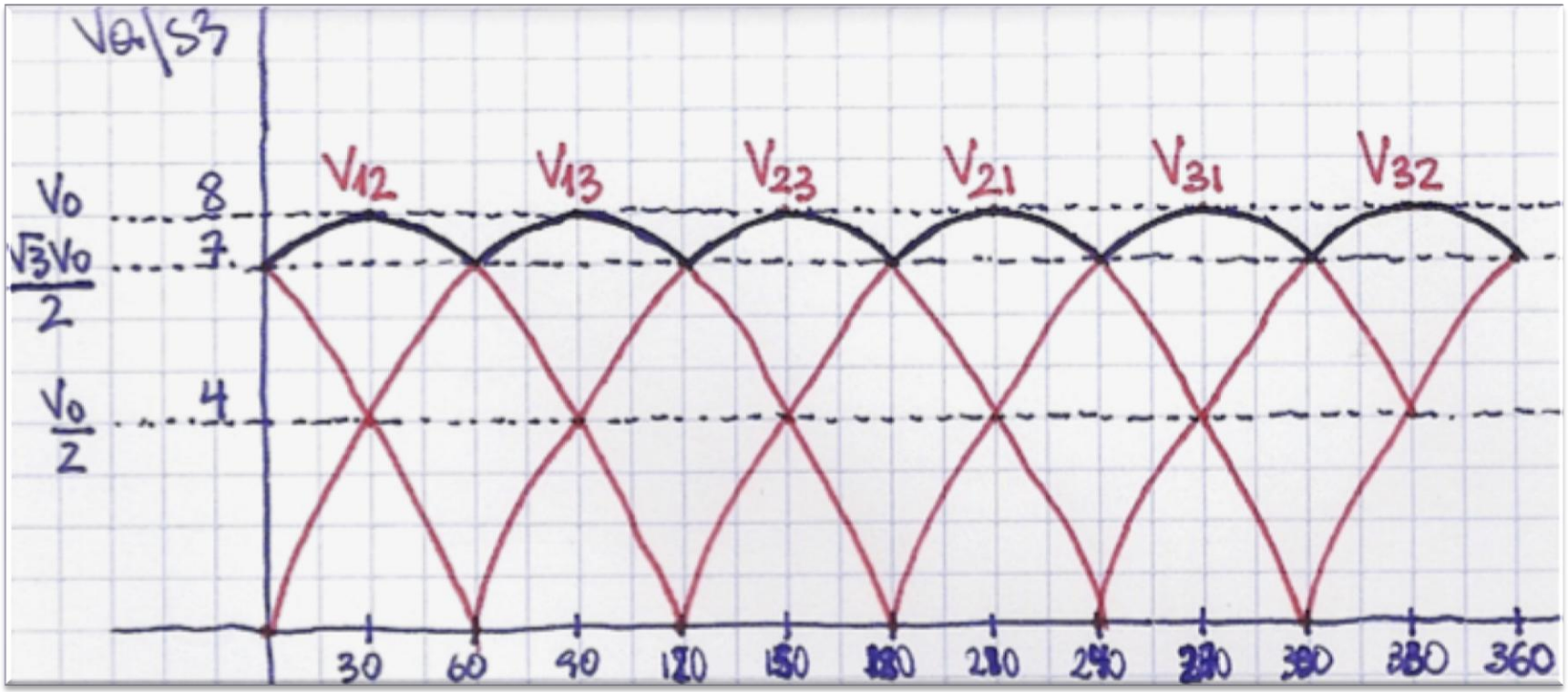


$$V_{L\varphi}\big|_{S3} = V_{L\varphi}\big|_{PD3} \Rightarrow \frac{3V_0}{\pi} = \frac{3\sqrt{3}V_0'}{\pi} \Rightarrow V_0' = \frac{1}{\sqrt{3}}V_0$$

Acoplamientos: S3 || PD3 (1T)

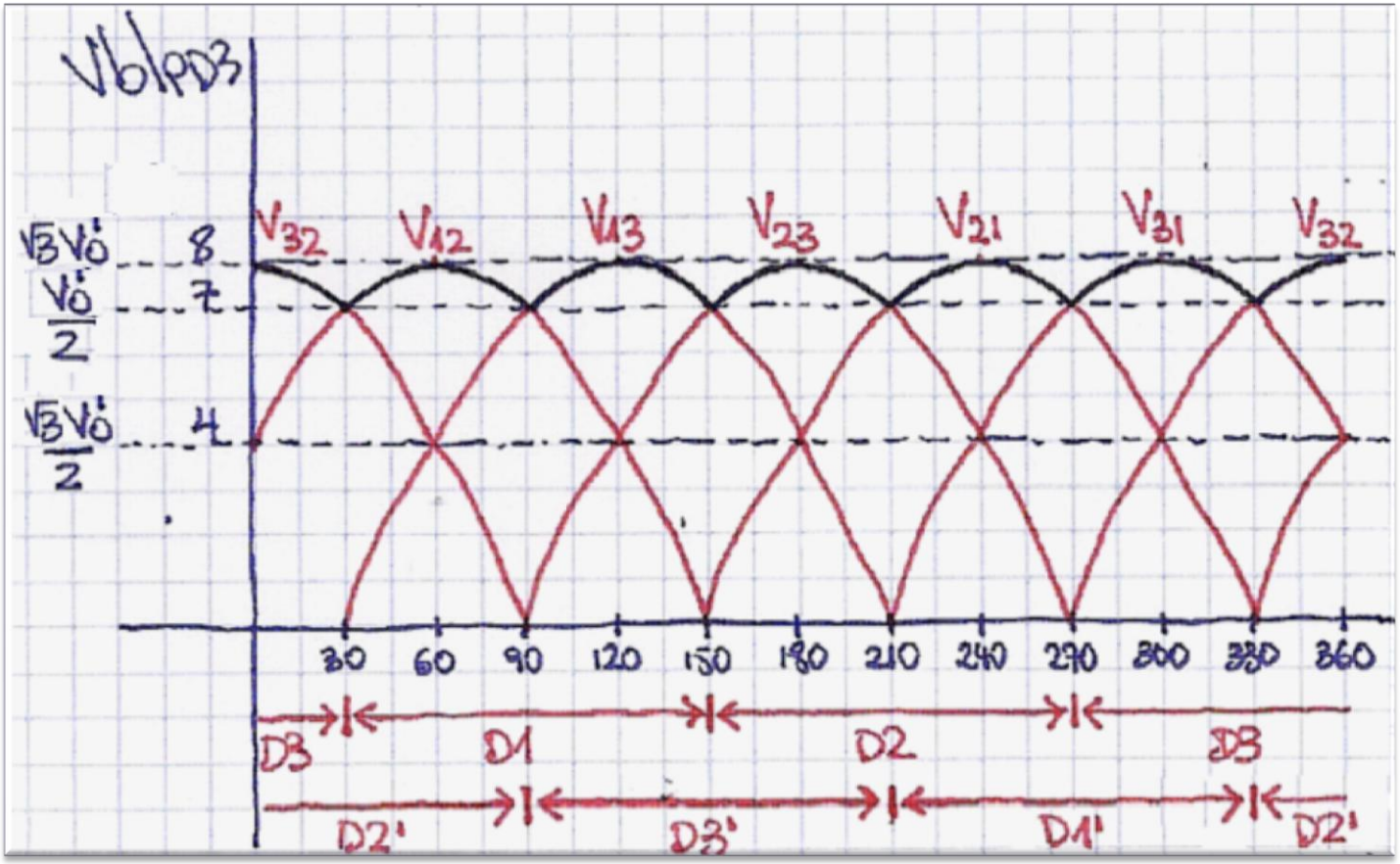
$$S3 \Rightarrow V_{13} \xrightarrow{60^\circ} V_{23} \xrightarrow{60^\circ} V_{21} \xrightarrow{60^\circ} V_{31} \xrightarrow{60^\circ} V_{32} \xrightarrow{60^\circ} V_{12}$$

$$V_{13} \equiv V_1$$



Acoplamientos: S3 || PD3 (1T)

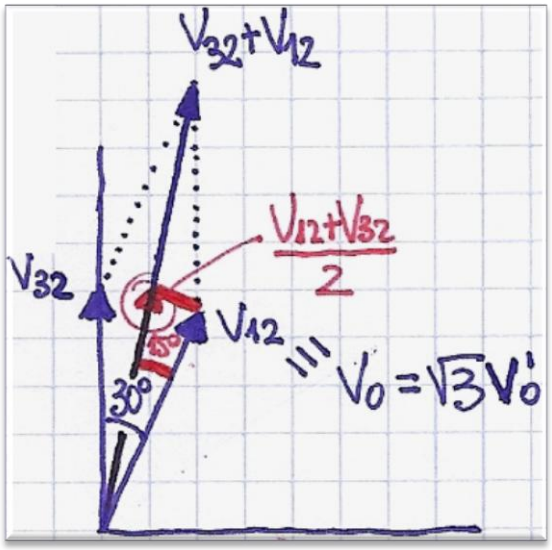
$$PD3 \Rightarrow V_1 \xrightarrow{30^\circ} V_{13} \xrightarrow{60^\circ} V_{23} \xrightarrow{60^\circ} V_{21} \xrightarrow{60^\circ} V_{31} \xrightarrow{60^\circ} V_{32} \xrightarrow{60^\circ} V_{12}$$



Acoplamientos: S3 || PD3 (1T)

$$V_\ell = \frac{V_a + V_b}{2}$$

$$0 \div 30^\circ \quad V_\ell = \frac{V_{12} + V_{32}}{2}$$



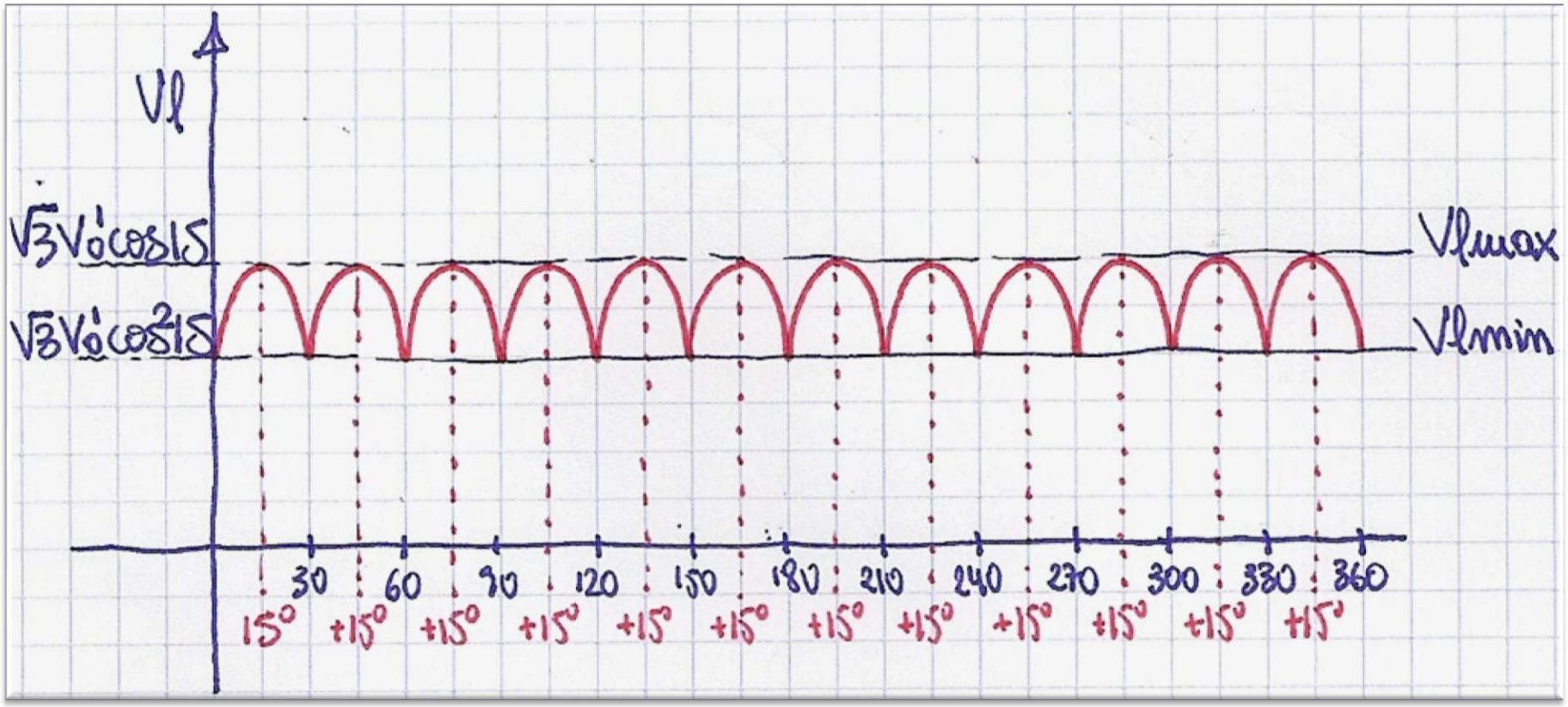
$$V_L = \sqrt{3} \cdot V_0' \cdot \cos 15^\circ \cdot \cos(\alpha - 15^\circ)$$

$$\Rightarrow \alpha = 0^\circ \Rightarrow V_L = \sqrt{3} \cdot V_0' \cdot \cos^2 15^\circ \Rightarrow V_L\big|_{MIN}$$

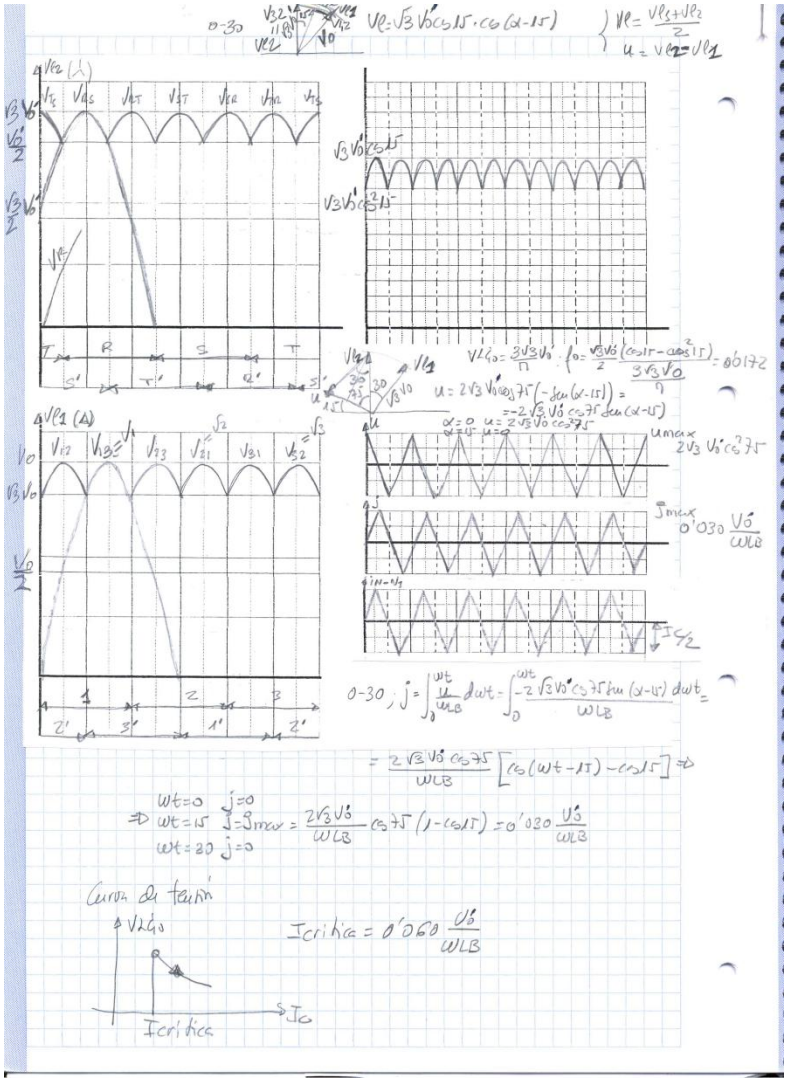
$$\Rightarrow \alpha = 15^\circ \Rightarrow V_L = \sqrt{3} \cdot V_0' \cdot \cos 15^\circ \Rightarrow V_L\big|_{MAX}$$

$$\Rightarrow \alpha = 30^\circ \Rightarrow V_L = \sqrt{3} \cdot V_0' \cdot \cos^2 15^\circ \Rightarrow V_L\big|_{MIN}$$

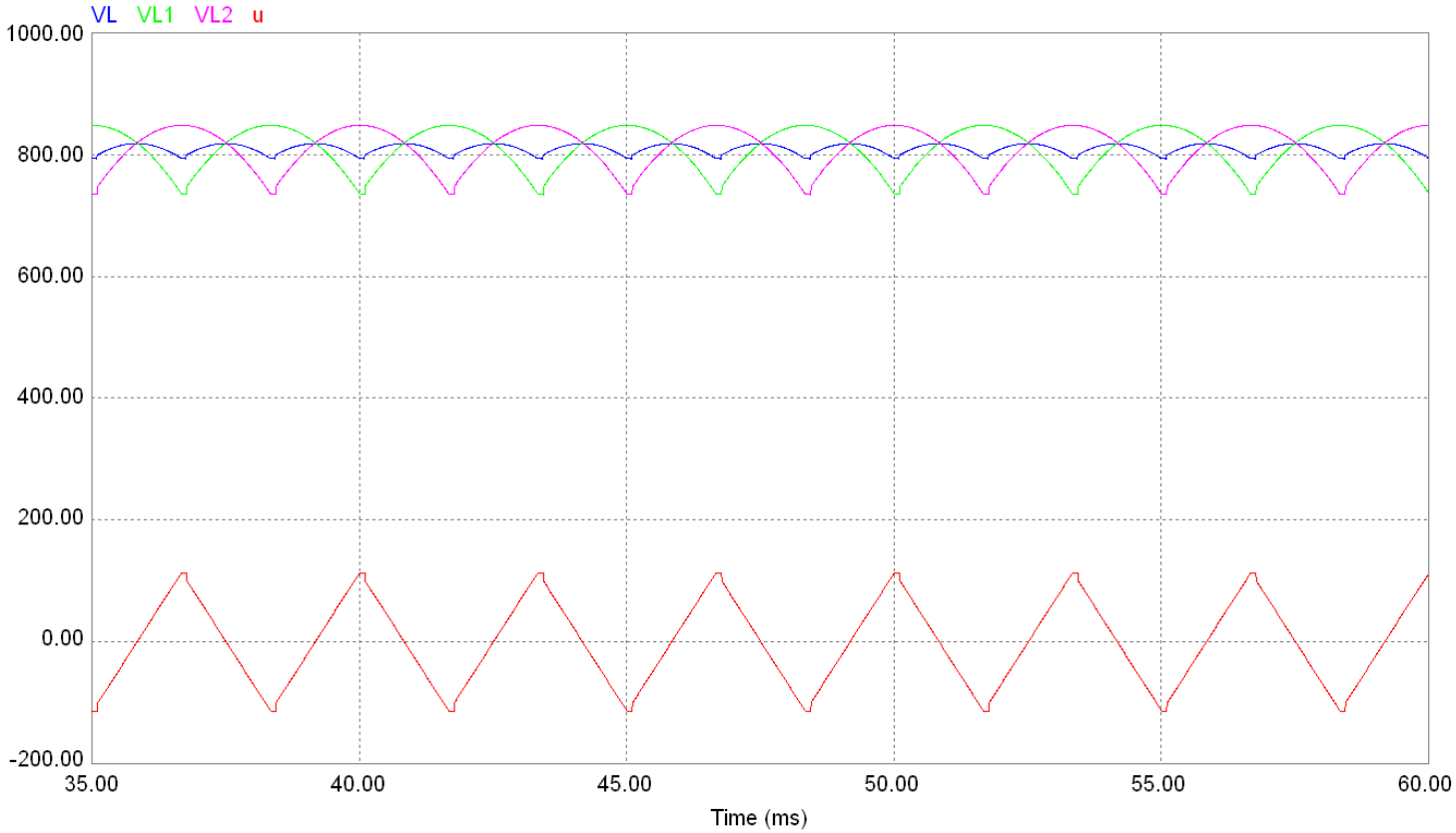
Acoplamientos: S3 || PD3 (1T)



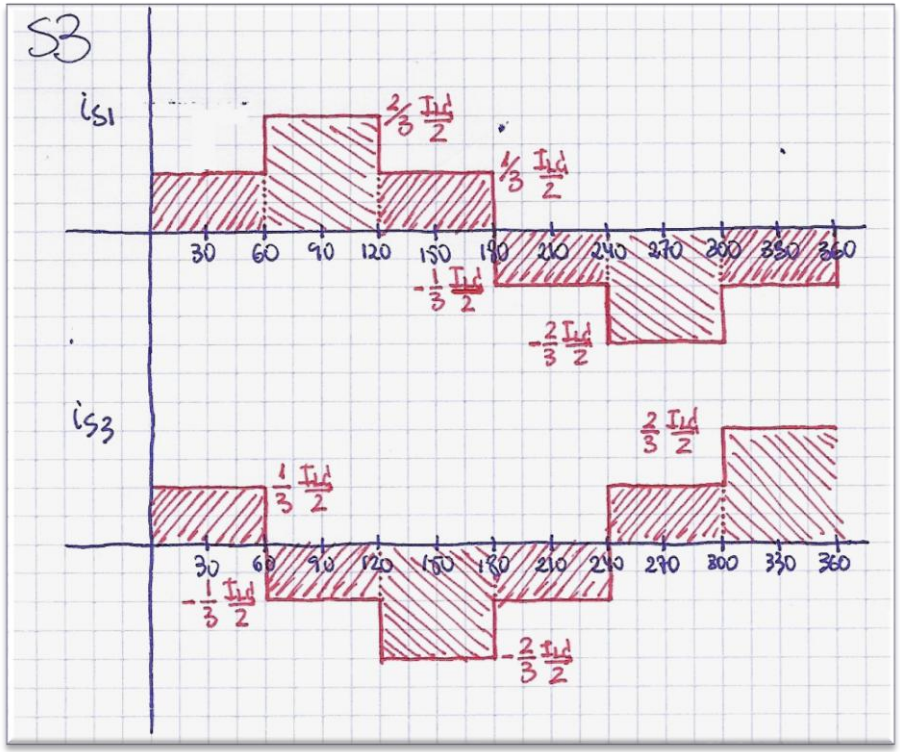
Acoplamientos: S3 || PD3 (1T)



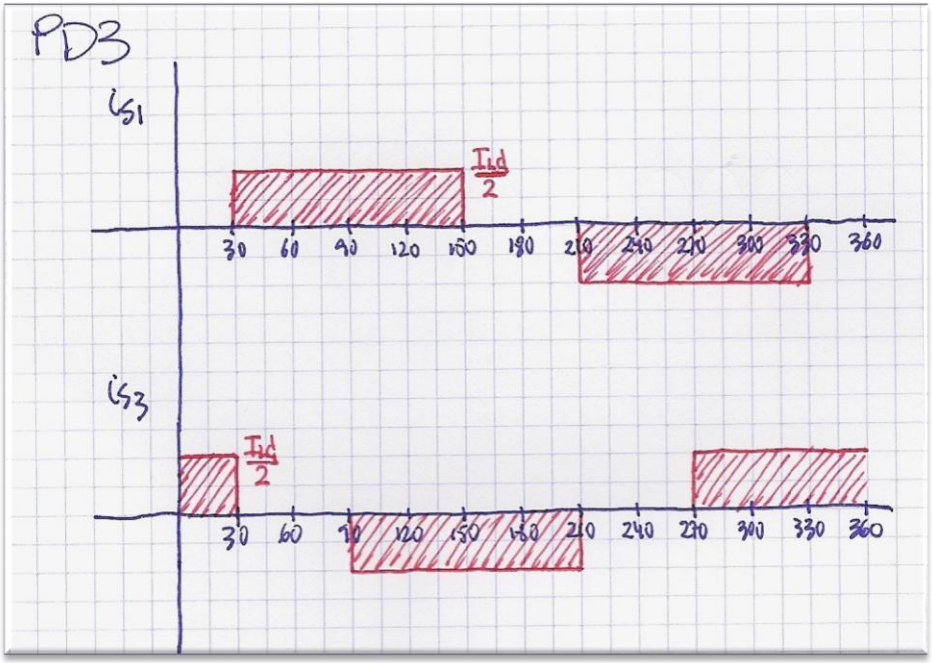
Acoplamientos: S3 || PD3 (1T)



Acoplamientos: S3 || PD3 (1T)



$$I_S = \sqrt{\frac{1}{2\Pi}\cdot\left[4\times\frac{\Pi}{3}\times\left(\frac{1}{3}\cdot\frac{I_C}{2}\right)^2 + 2\times\frac{\Pi}{3}\times\left(\frac{2}{3}\cdot\frac{I_C}{2}\right)^2\right]} = \frac{\sqrt{2}}{3}\cdot\frac{I_C}{2}$$

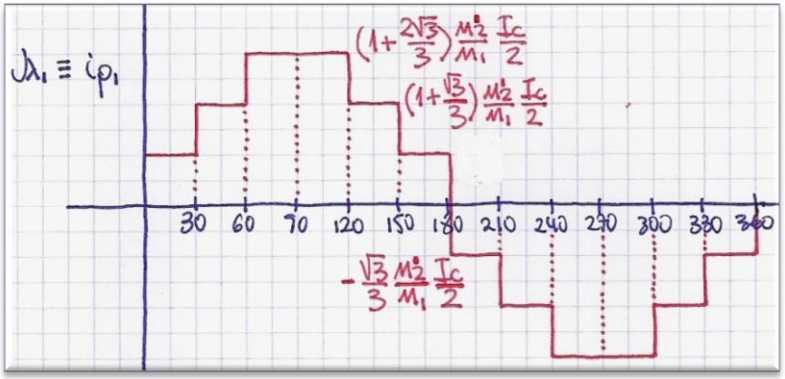


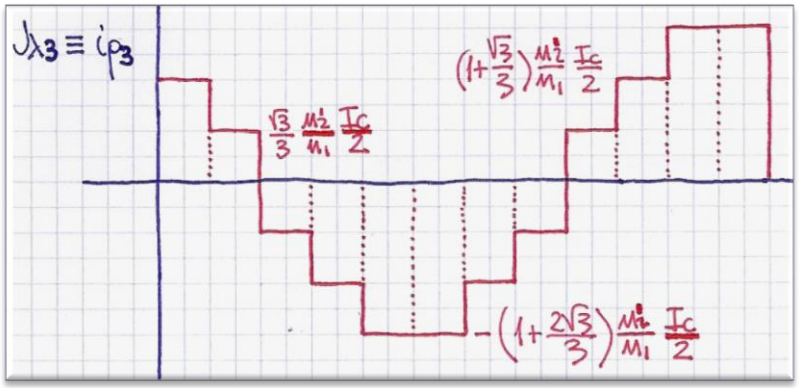
$$I_S = \sqrt{\frac{1}{2\Pi}\cdot\left[4\times\frac{\Pi}{3}\times\left(\frac{I_C}{2}\right)^2\right]} = \sqrt{\frac{2}{3}}\cdot\frac{I_C}{2}$$

Acoplamientos: S3 || PD3 (1T)

$$i_\varphi = \frac{n_2}{n_1} i_s\Big|_{S3} + \frac{n_2'}{n_1} i_s\Big|_{PD3}$$

$$i_\varphi = \sqrt{3}\,\frac{n_2'}{n_1} i_s\Big|_{S3} + \frac{n_2'}{n_1} i_s\Big|_{PD3}$$



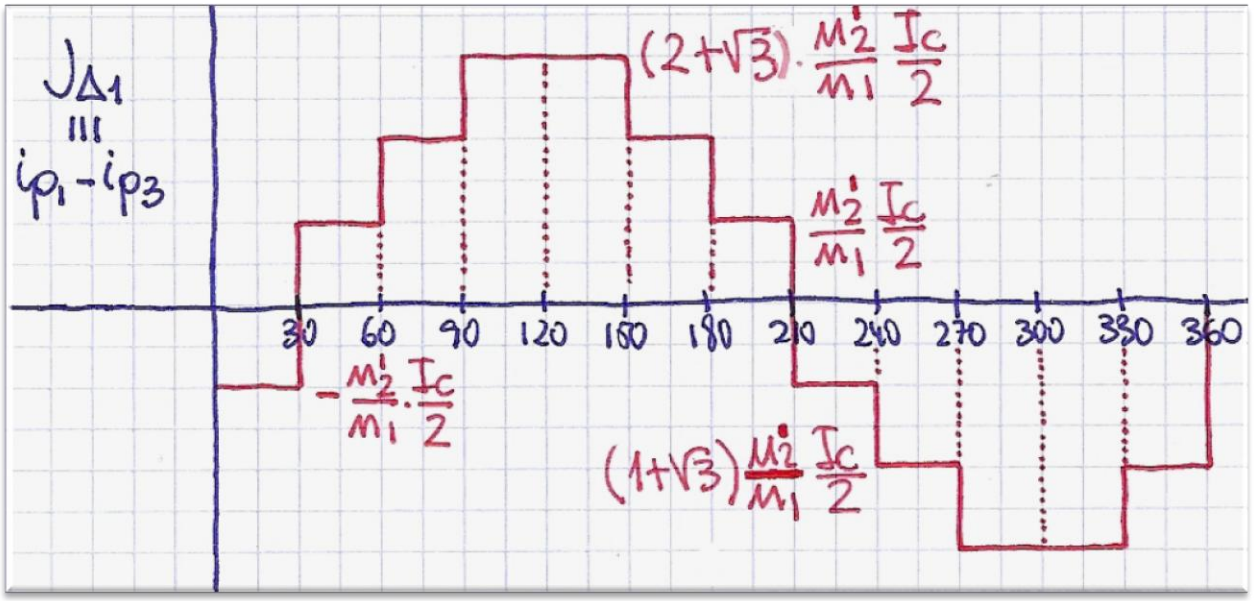


$$J_\lambda = \sqrt{\frac{1}{2\Pi}\cdot\left[4\times\frac{\Pi}{6}\times\left(\frac{\sqrt{3}}{3}\cdot\frac{n_2'}{n_1}\cdot\frac{I_C}{2}\right)^2 + 4\times\frac{\Pi}{6}\times\left(\left(1+\frac{\sqrt{3}}{3}\right)\cdot\frac{n_2'}{n_1}\cdot\frac{I_C}{2}\right)^2 + 4\times\frac{\Pi}{6}\times\left(\left(1+\frac{2\sqrt{3}}{3}\right)\cdot\frac{n_2'}{n_1}\cdot\frac{I_C}{2}\right)^2\right]}$$

$$J_\lambda = \frac{n_2'}{n_1}\cdot\frac{I_C}{2}\cdot\sqrt{\frac{1}{3}\cdot\left[\left(\frac{\sqrt{3}}{3}\right)^2 + \left(1+\frac{\sqrt{3}}{3}\right)^2 + \left(2+\frac{\sqrt{3}}{3}\right)^2\right]} = \frac{n_2}{n_1}\cdot\frac{I_C}{2}\cdot\sqrt{\frac{1}{3}\cdot\left[\frac{3}{9}+\left(1+\frac{2\sqrt{3}}{3}+\frac{3}{9}\right)+\left(1+\frac{4\sqrt{3}}{3}+\frac{12}{9}\right)\right]}$$

$$J_\lambda = \frac{n_2'}{n_1}\cdot\frac{I_C}{2}\cdot\sqrt{\frac{4+2\sqrt{3}}{3}}$$

Acoplamientos: S3 || PD3 (1T)



$$J_\Delta = \sqrt{\frac{1}{2\Pi} \cdot \left[4 \times \frac{\Pi}{6} \times \left(\frac{I_C}{2}\right)^2 + 4 \times \frac{\Pi}{6} \times \left(\left(1+\sqrt{3}\right) \cdot \frac{n_2'}{n_1} \cdot \frac{I_C}{2} \right)^2 + 4 \times \frac{\Pi}{6} \times \left(\left(2+\sqrt{3}\right) \cdot \frac{n_2'}{n_1} \cdot \frac{I_C}{2} \right)^2 \right]}$$

$$J_\Delta = \frac{n_2'}{n_1} \cdot \frac{I_C}{2} \cdot \sqrt{\frac{1}{3} \cdot \left[(1)^2 + \left(1+\sqrt{3}\right)^2 + \left(2+\sqrt{3}\right)^2 \right]} = \frac{n_2}{n_1} \cdot \frac{I_C}{2} \cdot \sqrt{\frac{1}{3} \cdot \left[1 + \left(1+2\sqrt{3}+3\right) + \left(4+4\sqrt{3}+3\right) \right]}$$

$$J_\Delta = \frac{n_2'}{n_1} \cdot \frac{I_C}{2} \cdot \sqrt{4+2\sqrt{3}} = \sqrt{3} \cdot J_\lambda$$