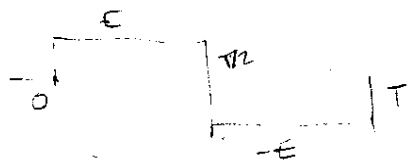


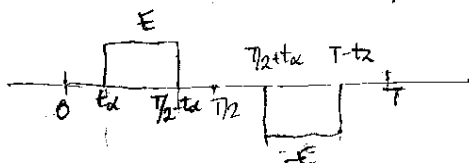
PRIMER PARCIAL 2012 2/5/12  
PROBLEMA INVERSOSES

a)  $U_{AC1}$



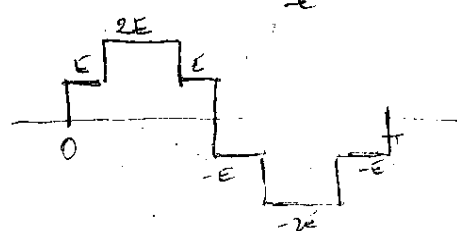
$$U_{AC1n} = \frac{2\sqrt{2}E}{n\pi} \operatorname{sen}\left(\frac{n\pi}{2}\right)$$

$U_{AC2}$



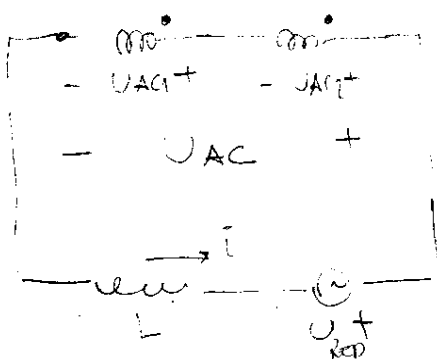
$$U_{AC2n} = \frac{2\sqrt{2}E}{n\pi} \operatorname{sen}\left(\frac{n\pi}{2}\right) \cos(n\alpha)$$

$U_{AC}$



$$U_{ACn} = U_{AC1n} + U_{AC2n} = \frac{2\sqrt{2}E}{n\pi} \operatorname{sen}\left(\frac{n\pi}{2}\right) [1 + \cos(n\alpha)] = U_{ACn}$$

b)



$$U_{ACn} - U_{REDn} = -L \frac{di}{dt}$$

$$i_n = \frac{-U_{ACn} + U_{REDn}}{Ljn\omega}$$

$$i_n = \frac{-U_{ACn} + U_{REDn}}{Ljn\omega} = 0 \rightarrow U_{ACn} = U_{REDn}$$

$$\frac{-2\sqrt{2}E}{n\pi} \operatorname{sen}\left(\frac{n\pi}{2}\right) (1 + \cos(n\alpha)) \rightarrow \cos(n\alpha) = -1$$

$$7\alpha = 180^\circ \rightarrow \alpha = 25.7^\circ, U_{\Delta} = 1.712.E$$

$$7\alpha = 180^\circ + 360^\circ \rightarrow \alpha = 77.1^\circ, U_{\Delta} = 1.101.E$$

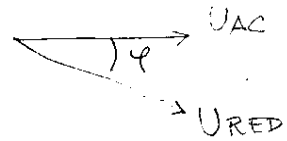
$$7\alpha = 180^\circ + 2 \times 360^\circ \rightarrow \alpha = 128.6^\circ \times$$

$$\rightarrow \alpha = 25.7^\circ$$

c)  $S_{RED} = U_{RED} \cdot I^*$  → solo habrá intercambio de potencia en la red para  $n=1$  (red ideal).

$$i_{ef} = \frac{U_{RED} - U_{AC1,ef}}{LW}$$

$$S_{RED} = \frac{U_{RED} \cdot e^{-j\varphi} (U_{RED} e^{j\varphi} - U_{AC1,ef})}{LW} \cdot J$$



$$S_{RED} = \frac{U_{RED}^2 - U_{RED} \cdot U_{AC1,ef} e^{-j\varphi}}{LW}$$

$$S_{RED} = \frac{U_{RED}^2 - U_{RED} \cdot U_{AC1,ef} \cos\varphi + U_{RED} U_{AC1,ef} \sin\varphi \cdot J}{LW}$$

$$P_{RED} = - \frac{U_{RED} U_{AC1,ef} \sin\varphi}{LW}$$

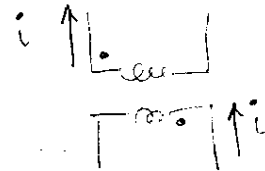
Balance de potencia:  $P_{RED} = P_{DC}$

$$P_{DC} = E \langle i_{dc} \rangle = \frac{U_{RED} U_{AC1,ef} \sin\varphi}{LW}$$

$$\langle i_{dc} \rangle = \frac{U_{RED} \cdot 2\sqrt{2} \cdot (1 + \cos\alpha) \sin\varphi}{\pi LW}$$

d)

|         | $0 < t < t_\alpha$ | $t_\alpha < t < \frac{T}{2} - t_\alpha$ | $\frac{T}{2} - t_\alpha < t < \frac{T}{2}$ |
|---------|--------------------|---|--|
| $i > 0$ | D1, D4<br>D5, T7   | D1, D4<br>D5, D8                        | D4, D4<br>D5, T7                           |
| $i < 0$ | T1, T4<br>D7, T8   | T1, T4<br>T8, T8                        | T1, T4<br>D7, T8                           |



$0 < t < T/2$

$U_{AC1} = E \rightarrow$  circula  $LL1$  y  $LL4$   $\begin{cases} i > 0 & D1, D4 \text{ ON} \\ i < 0 & T1, T4 \text{ ON} \end{cases}$

$0 < t < t_\alpha$  y  $T/2 - t_\alpha < t < T/2$

$U_{AC2} = 0 \rightarrow$  circula  $LL5$  y  $LL7$   $\begin{cases} i > 0 & D5, T7 \text{ ON} \\ i < 0 & T8, D7 \text{ ON} \end{cases}$

$t_\alpha < t < T/2 - t_\alpha$

$U_{AC2} = E \rightarrow$  circula  $LL6$  y  $LL8$   $\begin{cases} i > 0 & D5, D8 \text{ ON} \\ i < 0 & T8, T8 \text{ ON} \end{cases}$