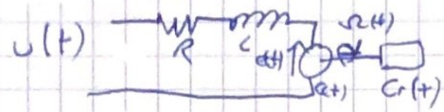
Préparation TP 3

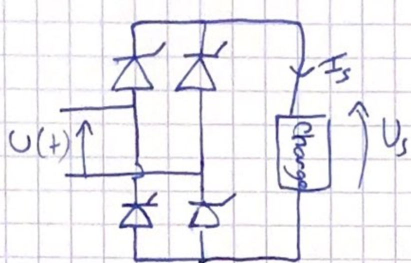
III-1 Machine à courant continu



$e(t) = K \times \Omega(t)$
$C(t) = K \times i(t)$

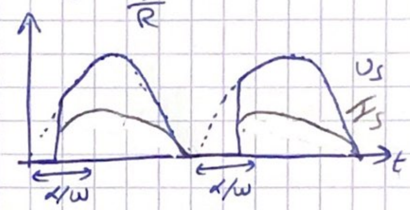
$$J \frac{d\Omega}{dt}(t) = C(t) - C_R(t)$$

III-2 Redresseur monophasé à thyristors



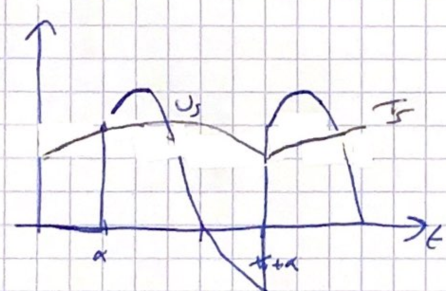
Pour une charge purement résistive :

$$I_s = \frac{U_s}{R}$$



Charge R-L fortement inductive

$$U_s = L\frac{dI_s}{dt} + RI_s \simeq U_s = \int \frac{U_c}{L}\,dt$$



Charge R-L faiblement inductive

$U_s = U$

$$RI_s + L\frac{dI_s}{dt} = V_e\sqrt{2}\sin(\omega t)$$

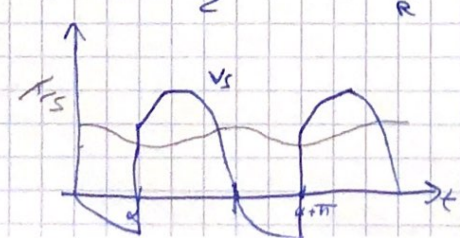
$$I_s = Ke^{-\frac{t}{\tau}} + \frac{V_R\sqrt{2}}{Z}\sin(\omega t - \varphi_2)$$

Charge RLE fortement inductive :

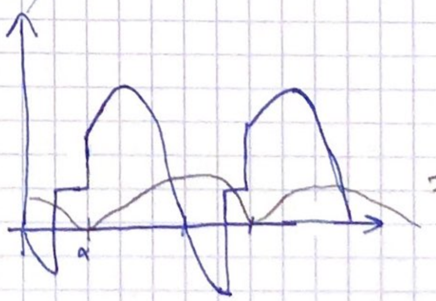
$U_s = U$

$$RI_s + L\frac{dI_s}{dt} = V\sqrt{2}\sin\omega t - E$$

$$\Leftrightarrow I_s = Ke^{-\frac{t}{\tau}} + \frac{U_e\sqrt{2}}{Z}\sin(\omega t - \varphi_2) - \frac{E}{R}$$



Charge faiblement inductive



Puissance en régime non sinusoïdal

$$P = \langle u_R, i_R \rangle = \frac{1}{T}\int_0^T U_R\sqrt{2}\sin(\omega t)\sum_{h=1}^{\infty} I_{Rh}\sqrt{2}\sin(h\omega t - \varphi_h)\,dt$$

$$= \frac{2U_R}{T}\left[\int_0^T I_{R1}\sin(\omega t)\sin(\omega t - \varphi_1)\,dt + \underbrace{\sum_{h=2}^{\infty}\int_0^T \sin(\omega t)\sin(h\omega t - \varphi_h)\,dt}_{=0}\right]$$

$$= \frac{2U_R}{T} I_{R1}\left[\int_0^T \sin^2(\omega t)\cos(\varphi_1)\,dt - \underbrace{\int_0^T \sin(\omega t)\cos(\omega t)\sin(\varphi_1)\,dt}_{=0}\right]$$

$$= U_R I_{R1}\cos(\varphi_1)$$

$$I_{R1a} = I_{R1}\cos(\varphi_1)$$