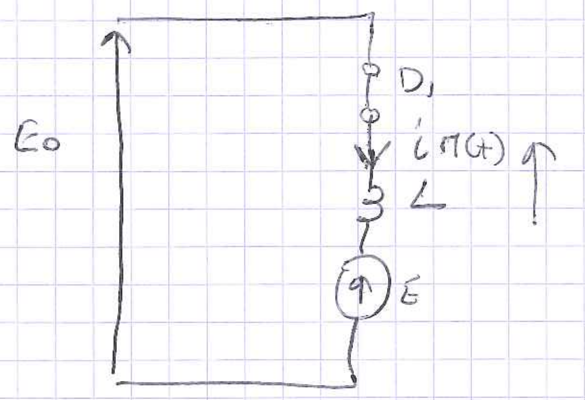
3. Le hacheur 2 quadrants réversible en courant :

(Suite)

4. (Suite)

entre 0 et αT.

D_1 passante, T_2 bloqué.



$$E_0 - L\frac{di}{dt} - E = 0$$

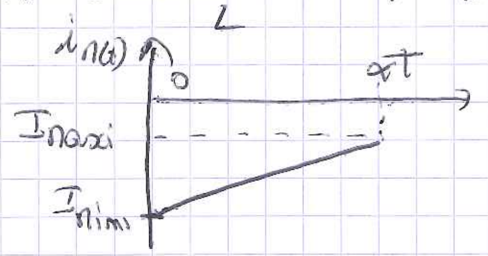
$$\frac{di}{dt} = \frac{E_0 - E}{L}$$

$$\boxed{i_M(t) = \frac{E_0 - E}{L} . t + k}$$

à $t = 0$ $\quad i_M(0) = I_{mini}$

Soit :

$$i_M(t) = \frac{E_0 - E}{L} t + I_{mini}$$



3.2. forme d'ondes

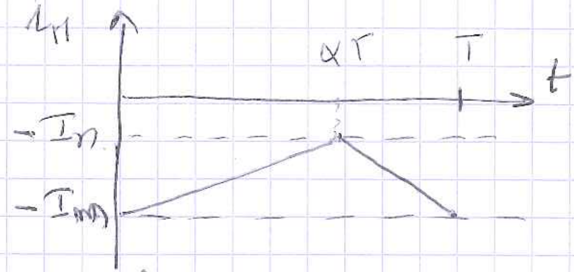
Exercice 9 :

1 -

$$\langle u_H \rangle = \frac{1}{\cancel{T}}\left(E_0 \cdot \alpha \cdot \cancel{T}\right)$$

$$\boxed{\langle u_H \rangle = E_0 \cdot \alpha}$$

2 -



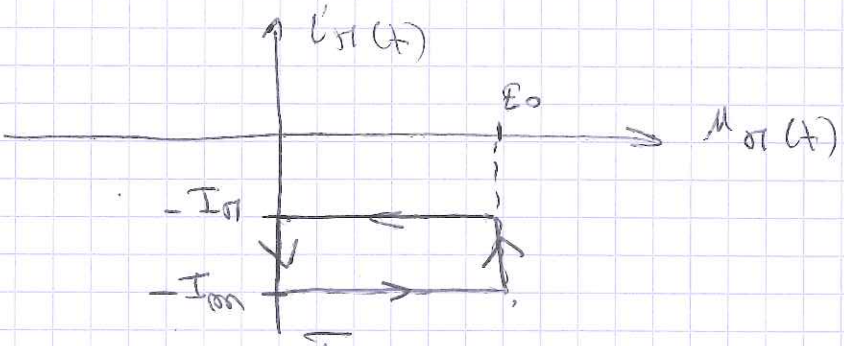
$$\underbrace{-I_m - -I_H}_{2}$$

$$\langle i_H \rangle = \frac{1}{T}\left(-I_H \times \cancel{\alpha} T + \frac{(-I_m - -I_H)}{2}\right)$$

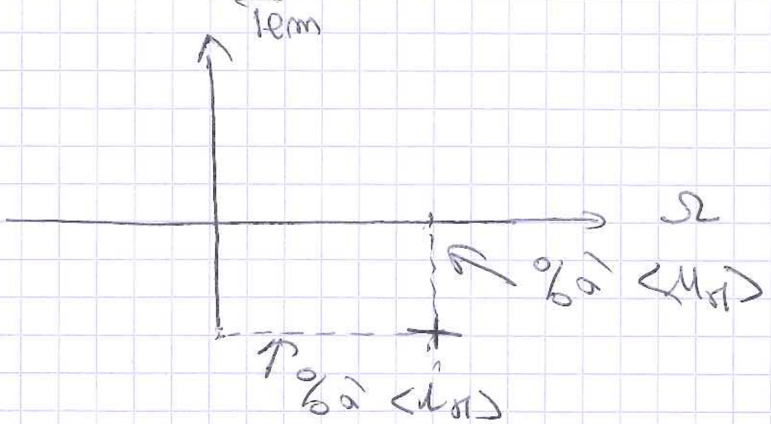
$$= \frac{1}{\cancel{T}}\left(-I_H \cdot \cancel{T} + +\left(\frac{I_H}{2} - \frac{I_m}{2}\right)\cancel{T}\right)$$

$$\boxed{\langle i_H \rangle = \frac{-(I_H + I_m)}{2}}$$

3 -



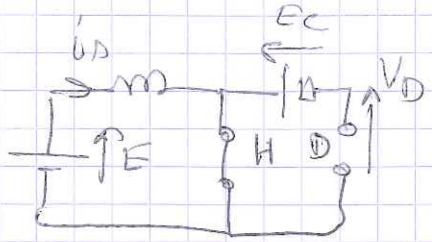
4 -



Exercice 10 :

1. D est bloqué quand H est passant car

$V_D = -E_c$.



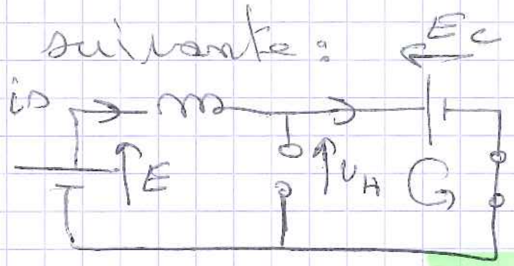
2. $i_S(t)$

$$E - L\frac{di}{dt} = 0$$

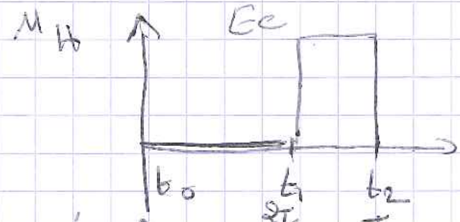
$$i = \frac{E}{L} \cdot t + k$$

à $t = 0$ $\quad i_{(0)} = I_m$ et $\boxed{i_{(t)} = \frac{E}{L} \cdot t + I_m}$

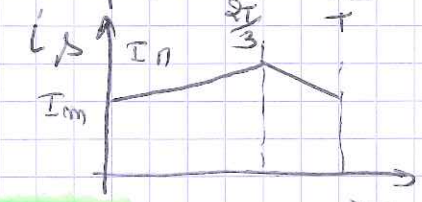
3. Quand H est ouvert le courant i_S circule dans la maille suivante :



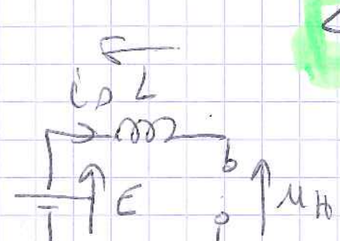
$$U_H - E_c = 0 \Rightarrow \boxed{u_H = E_c}$$



4.



$$\boxed{\langle u_H \rangle} = \frac{1}{T} E_c \cdot \frac{T}{3} = \boxed{\frac{E_c}{3}}$$



$$E - L\frac{di}{dt} - u_H = 0$$

$\boxed{\langle u_H \rangle = E}$ $\Rightarrow$ donc $\frac{E_c}{3} = E$ $\quad \boxed{E_c = 3E}$

$\boxed{E_c = 144V}$

5.

$$\boxed{\Delta I_s = I_M - I_m}$$

On sait que

$$i_s(t) = \frac{E}{L} \cdot t + I_m$$

$$i_s(t_1) = I_M = \frac{E}{L} \cdot \frac{2T}{3} + I_m$$

$t_1 = \frac{2T}{3}$

$$\Delta I = \frac{E}{L} \cdot \frac{2}{3} T$$

$$\Delta I = \frac{48}{25 \cdot \cancel{10^{-3}}} \times \frac{2}{3} \times 0{,}5 \cdot \cancel{10^{-3}}$$

$$\Delta I = 0{,}64 \text{ A}.$$

$$I_{s\,max} = \Delta I + I_{s\,min} = 0{,}64 + 12.$$

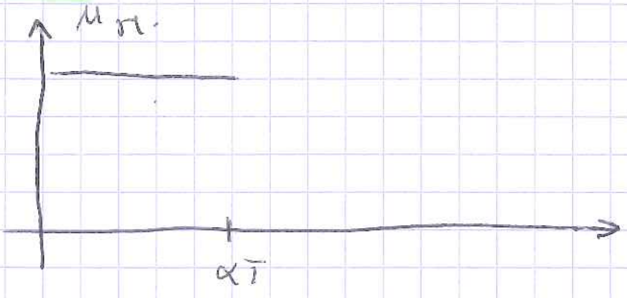
$$\boxed{I_{s\,max} = 12{,}64 \text{ A}}.$$

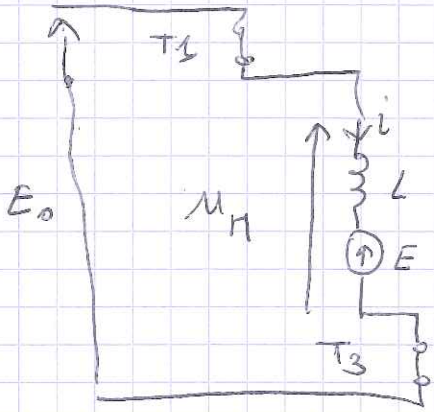
5. hacheur deux quadrants reversible en tension.

Exercice 11:

entre 0 et αT.

$T_1 T_3$ passant





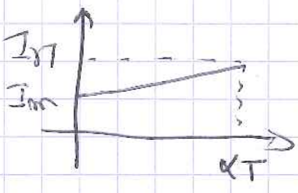
$$u_H = L\frac{di}{dt} + E = E_0$$

d'où $$\frac{di}{dt} = \frac{E_0 - E}{L}$$

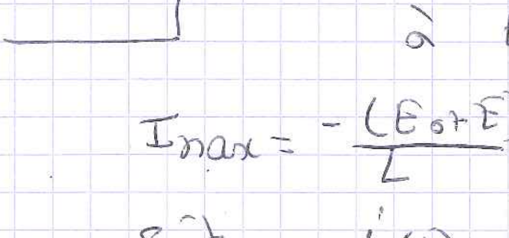
$$i(t) = \frac{E_0 - E}{L}\, t + k$$

CI : à $t = 0 \Rightarrow i_{(0)} = I_m$ d'où $k = I_m$.

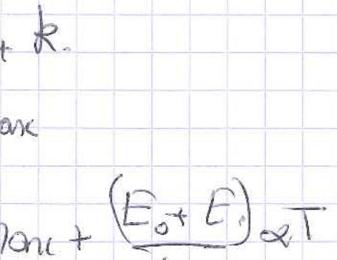
$$\boxed{i(t) = \frac{E_0 - E}{L}\, t + I_m}$$



entre T et αT.



$$u_H = -E_0$$



d'où

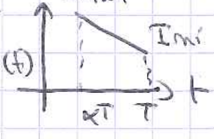
$$i(t) = -\frac{E_0 - E}{L}\, t + k$$

à $t = \alpha T$ $\quad i_{(\alpha T)} = I_{max}$

$$I_{max} = -\frac{(E_0+E)}{L}\alpha T + k \Rightarrow k = I_{max} + \frac{(E_0+E)}{L}\alpha T$$

Soit $$i(t) = -\frac{(E_0+E)}{L} t + I_{max} + \frac{(E_0+E)}{L}\alpha T$$

$$\boxed{i(t) = -\frac{(E_0+E)}{L}(t - \alpha T) + I_{max}}$$



Forme d'ondes : → Voir doc cours.

5.

$$\langle u_n \rangle = \frac{1}{T}\Big((E_0 - E)\alpha T - (E_0+E)(T-\alpha T)\Big)$$

$$= \frac{1}{\cancel{T}}\cancel{T}\Big((E_0-E)\alpha - (E_0+E)(1-\alpha)\Big)$$

$$= \Big(E_0\alpha - \cancel{E\alpha} - E_0 - E + E_0\alpha + \cancel{E\alpha}\Big)$$

$$= \Big(2E_0\alpha - (E_0+E)\Big)$$

$$\langle u_n \rangle = 2\alpha E_0 - (E_0+E)$$

$$= E_0(2\alpha - 1) - E$$

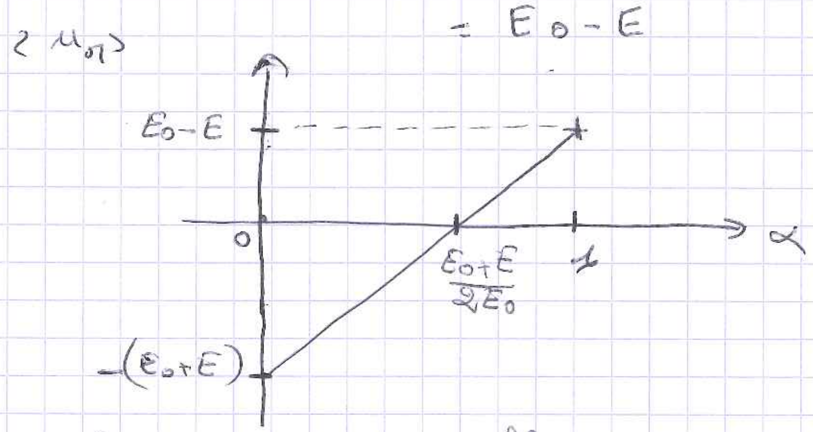
6.

Si $\alpha = 0$ $\langle u_n \rangle = -(E_0+E)$

Si $\alpha = 1$

$$\langle u_n \rangle = 2E_0 - E_0 - E$$

$$= E_0 - E$$



Pour la valeur nulle de $\langle u_n \rangle$:

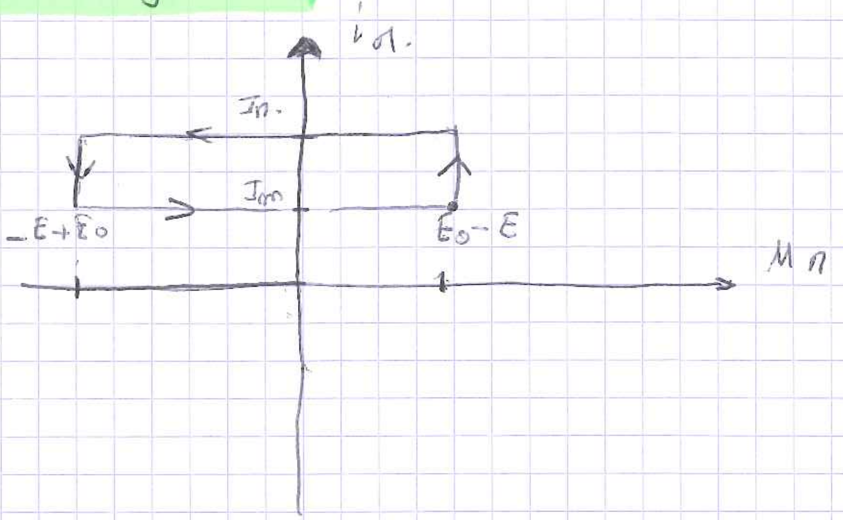
$$0 = E_0(2\alpha_1 - 1) - E$$

$$2\alpha_1 - 1 = \frac{E}{E_0}$$

$$2\alpha_1 = 1 + \frac{E}{E_0}$$

$$\alpha_1 = \frac{1}{2}\left(1 + \frac{E}{E_0}\right) = \boxed{\frac{E_0+E}{2E_0}}$$

7. Pt de fonction.



8. Grandeur mécanique

Si $\alpha < \frac{E_0+E}{2E_0}$
$\langle u_n \rangle < 0$.