CI's $U_1(0) = U_0$
$U_2(0) = 0$

1) On a $C_1 \dot{U}_1 = -C_2 \dot{U}_2$

donc $C_1 U_1 = -C_2 U_2 + cste$ CI's $C_1 U_0 = 0 + cste$

Enfin $\boxed{C_1 U_1 = -C_2 U_2 + C_1 U_0}$

2) LDM : $0 = RC_1 \dot{U}_1 + U_1 - U_2$ or $U_2 = \frac{C_1}{C_2}(U_0 - U_1)$

ie $RC_1 \dot{U}_1 + U_1 + \frac{C_1}{C_2} U_1 = \frac{C_1}{C_2} U_0$

$$\boxed{\dot{U}_1 + \frac{C_1 + C_2}{RC_1C_2} U_1 = \frac{U_0}{RC_2}}$$

$U_1 = U_{1SH} + U_{1SP}$

$U_{1SH} = Ae^{-t/\tau} \longrightarrow 0$, $U_{1SP} = \frac{C_1}{C_1 + C_2} U_0$ c'est DC2 !

3) Energie initiale : uniq. ds C_1

$$\mathcal{E}_0 = \frac{1}{2} C_1 U_0^2$$

Energie finale stockée dans C_1 ET dans C_2

C_1 : $\frac{1}{2} C_1 U_{DC}^2 = \frac{1}{2} C_1 \left(\frac{C_1}{C_1 + C_2} U_0\right)^2 = \frac{1}{2} \frac{C_1^3}{(C_1 + C_2)^2} U_0^2$

C_2 : $\frac{1}{2} C_2 U_{DC}^2 = \frac{1}{2} C_2 \left(\frac{C_1}{C_1 + C_2} U_0\right)^2 = \frac{1}{2} \frac{C_1^2 C_2}{(C_1 + C_2)^2} U_0^2$

Total : $\mathcal{E}_f = \frac{1}{2} \frac{C_1^3 + C_1^2 C_2}{(C_1 + C_2)^2} U_0^2 = \frac{1}{2} C_1^2 \frac{C_1 + C_2}{(C_1 + C_2)^2} U_0^2$

$$= \frac{1}{2} \left(\frac{C_1^2}{C_1 + C_2}\right) U_0^2$$

$\Rightarrow$ La $\neq$ d'énergie entre $\mathcal{E}_0$ et $\mathcal{E}_f$ est passée en effet Joule :

$$\Delta \mathcal{E}_{Joule} = \mathcal{E}_0 - \mathcal{E}_f = \frac{1}{2} C_1 U_0^2 - \frac{1}{2} \left(\frac{C_1^2}{C_1 + C_2}\right) U_0^2 = \frac{1}{2} \frac{C_1 C_2}{C_1 + C_2} U_0^2$$