Application 2

$$E_e = \frac{1}{2} C(u_c(t))^2 = \frac{1}{2} C E^2 \cos^2(\omega_0 t) \qquad (\text{dans } C)$$

$$E_m = \frac{1}{2} L(i(t))^2 = \frac{1}{2} L\, E^2 C^2 \omega_0^2 \sin^2(\omega_0 t) \qquad (\text{dans } L)$$

$$E(t) = E_e(t) + E_m(t) = \frac{1}{2} C E^2 \cos^2(\omega t) + \frac{1}{2} E^2 \underbrace{C^2 L \omega_0^2}_{C^2 L \frac{1}{LC} = C} \sin^2(\omega_0 t)$$

$$= \frac{1}{2} C E^2 \underbrace{\left(\cos^2(\omega t) + \sin^2(\omega t)\right)}_{1}$$

$$E(t) = \frac{1}{2} C E^2$$

L'énergie totale est constante, elle est égale à l'énergie initialement contenue dans le condensateur.

Application n° 3

$$u_c + Ri + u_L = 0 \qquad i = C \frac{du_c}{dt} \qquad u_L = L \frac{di_L}{dt}$$

$$u_c + RC \frac{du_c}{dt} + LC \frac{du_c}{dt} = 0$$

forme canonique : $\ddot{u}_c + \frac{R}{L} \dot{u}_c + \frac{1}{LC} u_c = 0$

on pourra identifier $\omega_0 = \frac{1}{\sqrt{LC}}$ $\quad \frac{\omega_0}{Q} = \frac{R}{L} \rightarrow Q = \omega_0 \frac{L}{R} = \frac{1}{R}\sqrt{\frac{L}{C}}$