TP 34 Résonance

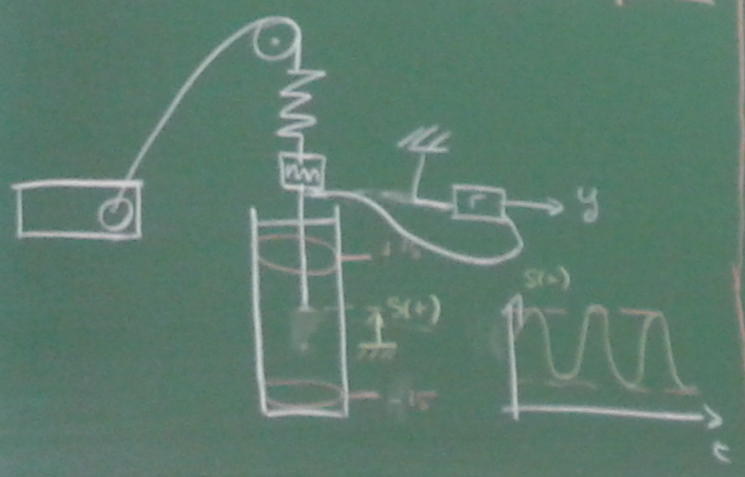
Introduction :

$$\frac{d^2x}{dt^2} + B\frac{dx}{dt} + \omega_0^2 x = E(t)$$

$$B = \left| \begin{array}{l} 2\gamma \\ \frac{\omega_0}{Q} \end{array} \right.$$

I La résonance. Instrument de mesure

a) Étude d'un système mécanique



$$m\frac{d^2x}{dt^2} + 2\gamma\frac{dx}{dt} + kx = A\sin\omega t \qquad \gamma' = \frac{\gamma}{m}$$

$$\omega_0' = \sqrt{\omega_0^2 - \gamma'^2}$$

$\omega_0 =$

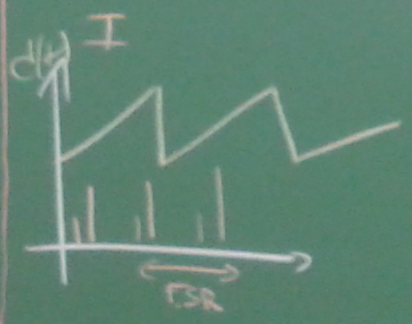
$\omega_0' =$

$\gamma' =$

b) Résonance optique

$$I = \frac{1}{1 + T^2 - 2T\cos\theta}$$

$$\theta = \frac{8\pi d}{\lambda}$$ $I_{max} \leftrightarrow d = \frac{\lambda n}{4}$

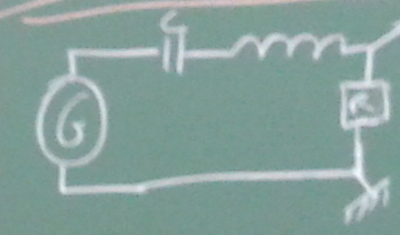


TSR → 2GHz

$\Delta t =$

$\Delta V =$

c) Mesure d'une

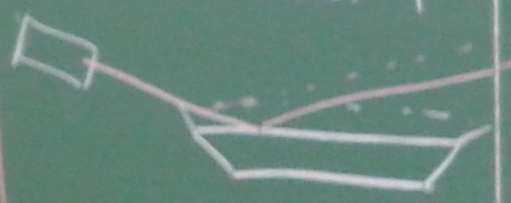


$$I = \frac{U_R}{R\left|1 + jQ\left(\frac{\omega}{\omega_0} - \frac{\omega_0}{\omega}\right)\right|}$$

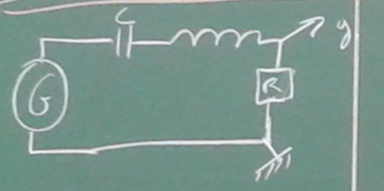
La Maîtrise d

a) Un phénomène

Cas du haut pu



c) Mesure d'une inductance



$C = 0{,}101\,\mu F$

$R = 124{,}1\,k\Omega$

$I = \dfrac{U_e}{R\left|1 + jQ\left(\frac{\omega}{\omega_0} - \frac{\omega_0}{\omega}\right)\right|}$

$f_0 =$ $\pm$

$L =$

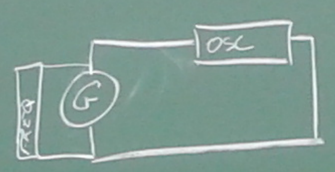
II La Maitrise de la résonance un enjeux majeur

a) Un phénomène gênant

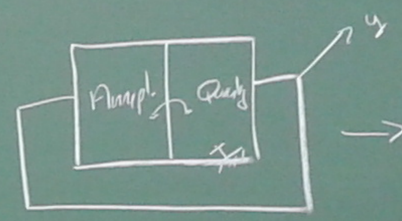
Cas du haut parleur

$f_0 =$

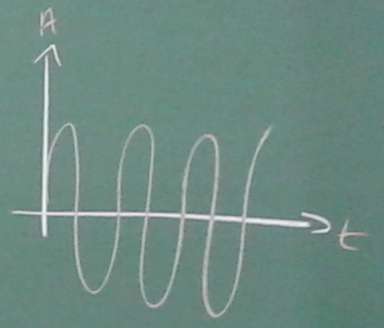
b) Fabrication d'une horloge



Boucle ouverte

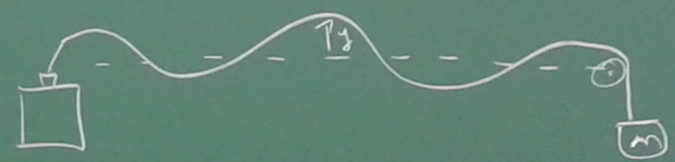


Boucle Fermée



c) Application musicale

$L = 1{,}94\,m$



$C = \sqrt{\dfrac{T}{\mu}} =$

$\mu = (1{,}29 \pm 0{,}13)\,10^{-3}\ kg\,m^{-1}$

$\dfrac{d^2y}{dx^2} - \dfrac{1}{c^2}\dfrac{d^2y}{dt^2} = A\sin(\omega t)$

$\omega_n = \dfrac{n\pi c}{L}$

$y = C\cos(\omega t)\,\dfrac{\sin\left(\frac{\omega}{c}(L-x)\right)}{\sin\left(\frac{\omega L}{c}\right)}$