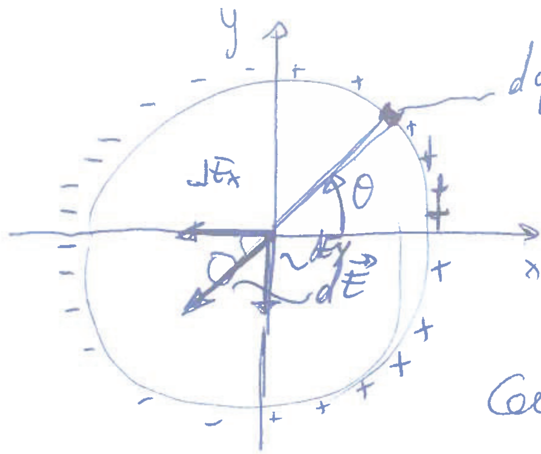
es 1:



$dq = \lambda \, dl = \lambda R d\theta = R\lambda_0 \cos\theta \, d\theta$

per simmetria il campo sarà diretto verso $(-\hat{x})$

$$dE = \frac{dq}{4\pi\varepsilon R^2} = \frac{\lambda_0 R \cos\theta \, d\theta}{4\pi\varepsilon R^2}$$

$$dE_x = dE \cos\theta = \frac{\lambda_0 \cancel{R} \cos^2\theta \, d\theta}{4\pi\varepsilon R^{\cancel{2}}}$$

$$dE_y = dE \sin\theta = \frac{\lambda_0 \cancel{R} \sin\theta \cos\theta \, d\theta}{4\pi\varepsilon R^{\cancel{2}}}$$

$$E_x = \int dE_x = \int_0^{2\pi} \frac{\lambda_0}{4\pi\varepsilon R} \cos^2\theta \, d\theta = \frac{\lambda_0}{4\varepsilon R}$$

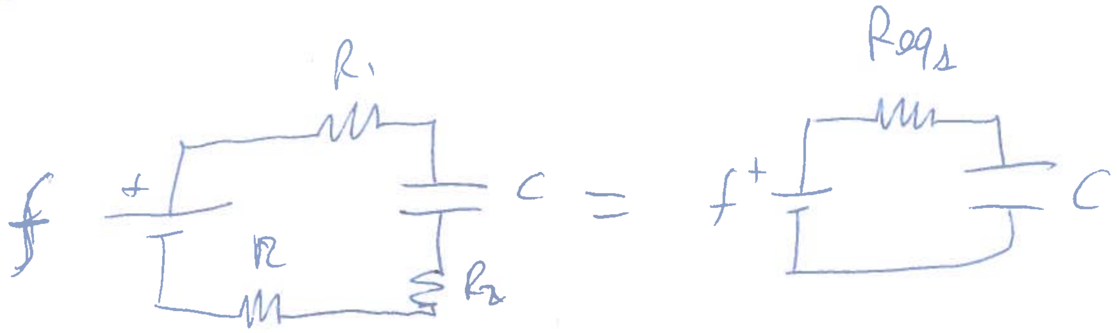
$$\vec{E}_x = -E_x \hat{x} = -\frac{\lambda_0}{4\varepsilon_0 R} \hat{x}$$

$$E_y = \int dE_y = \int_0^{2\pi} \frac{\lambda_0}{4\pi\varepsilon R} \sin\theta \cos\theta \, d\theta = \emptyset$$

$$\vec{E}_T = \vec{E}_x = -\frac{\lambda_0}{4\varepsilon R} \hat{x}$$

es 2:

Caso 1



$$Req_1 = R_1 + R_2 + r$$

$$U_{R_1} = \int_0^{+\infty} P_{R_1}\, dt = \int_0^{+\infty} R_1\, i^2(t)\, dt$$

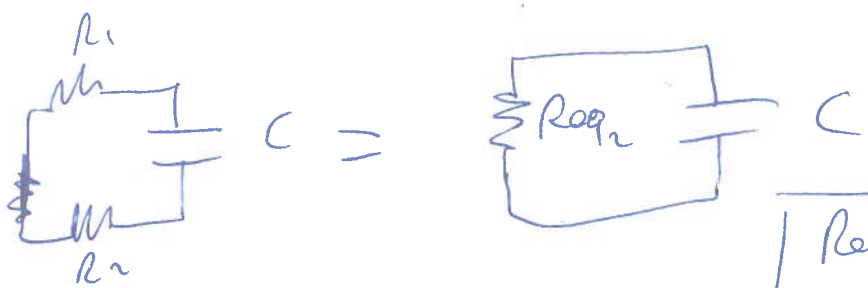
$$\boxed{\tau_1 = C\, Req_1}$$

$$i(t) = i_{0_1} e^{-\frac{t}{\tau_1}} = \frac{f}{Req_1} e^{-\frac{t}{C Req_1}}$$

$$U_{R_1} = \int_0^{+\infty} R_1 \frac{f^2}{Req_1^2} e^{-\frac{2t}{C Req_1}}\, dt = \frac{1}{2} \frac{R_1 f^2}{Req_1^2} \cancel{Req_1}\, C = \frac{1}{2} \frac{R_1 f^2 C}{R_1 + R_2 + r}$$

$$\boxed{C = 2 \cdot \frac{U_{R_1} \cdot Req_1}{f^2\, R_1}}$$

Caso 2

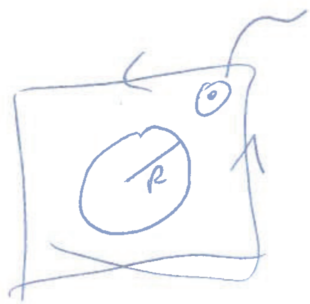


$$\boxed{\begin{array}{l} Req_2 = R_1 + R_2 \\ \tau_2 = C\, Req_2 \end{array}}$$

$$\tau_2 = C\, Req_2 = C(R_1 + R_2)$$

es. 3:   (3)

$B(t) = \mu_0 n\, i(t)$



$\phi_{spira}(B(t)) = \mu_0 n \pi R^2 i(t)$

$i(t) = i_0 t^2$

$$f_{em} = -\frac{d\phi}{dt} = -\mu_0 n \pi R^2 i_0 2t$$

corrente $i(t) = \frac{f_{em}}{\mathcal{R}} = -\frac{\mu_0 n \pi R^2 i_0 2}{\mathcal{R}}\, t$ (orario)

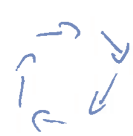
$$P_R(t) = \cancel{\mathcal{R}}\, \mathcal{R}\, i^2(t) = \cancel{\mathcal{R}}\, \frac{\mu_0^2 n^2 \pi R^4 i_0^2 4}{\mathcal{R}^{\cancel{2}}}\, t^2$$

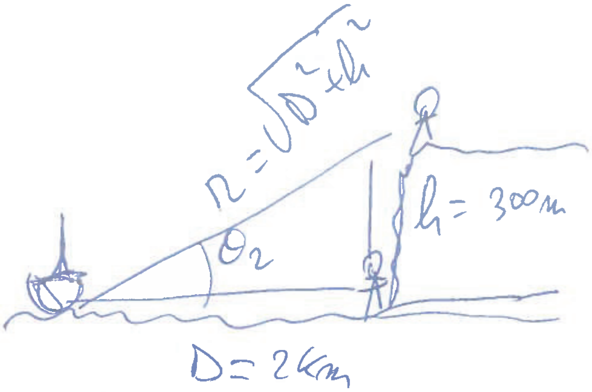
$$P_R(t_1) = \frac{\mu_0^2 n^2 \pi R^4 i_0^2 \cdot 4}{\mathcal{R}}\, t_1^2$$

$$f_{em} = -\frac{d\phi}{dt} = -\mu_0 n \pi R^2 i_0 2t = \oint \vec{E}\, d\vec{l} = 2\pi R E$$

da cui

$$E(t) = \frac{-\mu_0 n \cancel{\pi} R^{\cancel{2}} i_0 \cancel{2}}{\cancel{2\pi} \cancel{R}}\, t = -\frac{\mu_0 n R i_0}{1}\, t$$





$$\lambda = \frac{c}{\nu} = \frac{3\cdot 10^8}{1\cdot 10^6} = 300\,m \gg L = 1\,m$$

$$fem = \oint_0^L E\cdot dl = EL = fem_0 \cos(\omega t) = 2V\cos(\omega t)$$

Con $E = E_0 \cos(\omega t)$ $\quad \omega = 2\pi\nu \qquad E_0 L = (2V) \rightarrow E_0 = \frac{(2V)}{L}$

$$E_0 = \sqrt{\frac{2I}{c\varepsilon_0}} \qquad I = \frac{I_0 \operatorname{sen}^2\theta_1}{D^2} = \frac{I_0}{D^2} \qquad \theta_1 = 0$$

$\left(I = \frac{1}{2}\varepsilon_0 c E_0^2\right)$

$$P = \frac{8}{3\pi} I_0$$ per cui

$$P = \frac{8}{3\pi} I_0 = \frac{8}{3\pi} D^2 I = \frac{8}{3\pi} D^2 \frac{1}{2}\varepsilon_0 c E_0^2 = \frac{8}{3\pi} D^2 \frac{1}{2}\varepsilon_0 c \left[\frac{(2V)}{L}\right]^2$$

Sulla scogliera $\theta = \theta_2 \qquad \theta_2 = \operatorname{arctg}\left[\frac{h}{D}\right]$

$$I_2 = \frac{I_0 \operatorname{sen}^2(\theta_2)}{r^2} = \frac{I_0 \operatorname{sen}^2(\theta_2)}{(D^2+h^2)} \qquad \text{con } I_0 = \frac{3\pi}{8} P$$

$$E_{0_2} = \sqrt{\frac{2I_2}{c\varepsilon_0}} \rightarrow fem_2 = E_{0_2} L$$