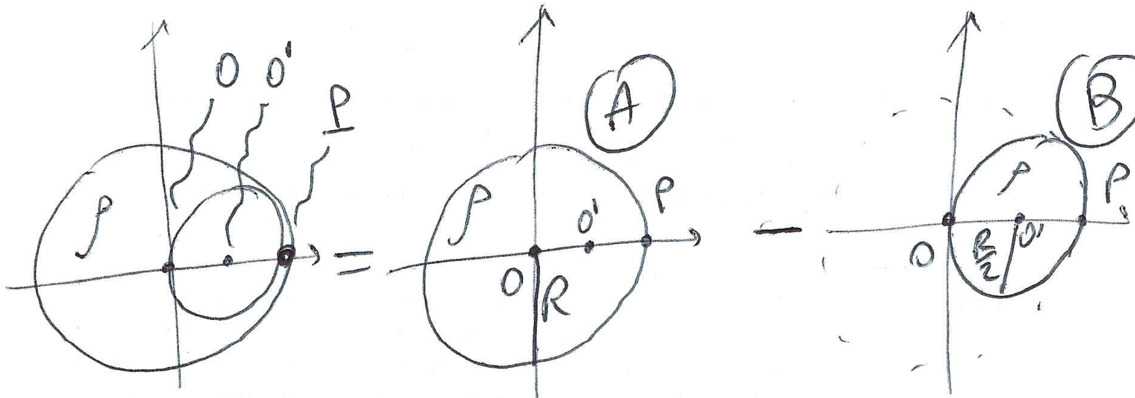
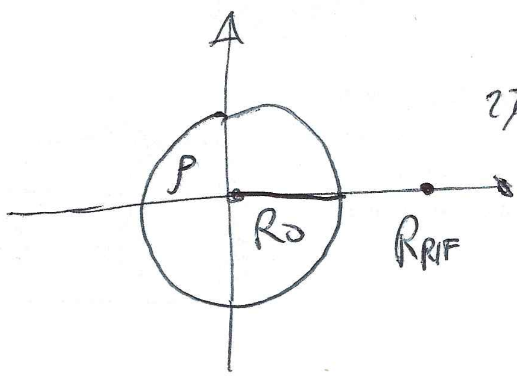
(1)



SOVRAPP. EFFETTI

IN GENERALE



per $r > R_0$

$$2\cancel{\pi} r \cancel{h}\, E_1(r) = \frac{\rho \cancel{\pi} R_0^2}{\varepsilon} \cancel{h}$$

$$\hookrightarrow E_1(r) = \frac{\rho R_0^2}{2\varepsilon r}$$

per $0 < r < R_0$

$$2\cancel{\pi} \cancel{r} \cancel{h}\, E_0(r) = \frac{\rho \cancel{\pi} r^{\cancel{2}} \cancel{h}}{\varepsilon}$$

$$\hookrightarrow E_0(r) = \frac{\rho}{2\varepsilon} r$$

$\boxed{R_{RIF} > R_0}$

per $r > R_0$

$$V(r) - V(R_{RIF}) = -\int_{R_{RIF}}^{r} E_1(r)\, dr = -\int_{R_{RIF}}^{r} \frac{\rho R_0^2}{2\varepsilon} \frac{dr}{r} =$$

$$= -\frac{\rho R_0^2}{2\varepsilon_0} \ln\left(\frac{r}{R_{RIF}}\right)$$

per $r < R_0$

$$V(r) - V(R_{RIF}) = -\int_{R_0}^{r} E_0(r)\,dr - \int_{R_{RIF}}^{R_0} E_1(r)\,dr =$$

$$= -\int_{R_0}^{r} \frac{\rho}{2\varepsilon}\, r\,dr - \frac{\rho R_0^2}{2\varepsilon} \ln\left(\frac{R_0}{R_{RIF}}\right) =$$

$$= -\frac{\rho}{4\varepsilon}\left(r^2 - R_0^2\right) - \frac{\rho R_0^2}{2\varepsilon_0} \ln\left(\frac{R_0}{R_{RIF}}\right)$$

$$E(A) = \frac{\rho R_0^2}{2\varepsilon_0 (2R)} - \frac{\rho \left(\frac{R}{2}\right)^2}{2\varepsilon_0\left(\frac{3}{2}R\right)} = \frac{\rho R^{\cancel{2}}}{4\varepsilon_0 R} - \frac{\rho R^{\cancel{2}}}{12\varepsilon R} =$$

$$= \frac{\rho R}{4\varepsilon}\left(1 - \frac{1}{3}\right) = \frac{\rho R}{6\varepsilon}$$

$$V(0) - V(A) = \left[\left(V(0) - V(A)\right)_{\text{caso A}} - \left(V(0) - V(A)\right)_{\text{caso B}}\right] =$$

$$= \left[\left(-\frac{\rho}{4\varepsilon_0}\left(-R^2\right) - \frac{\rho R^2}{2\varepsilon} \ln\left(\frac{R}{2R}\right)\right) - \underbrace{\left(-\frac{\rho\left(\frac{R}{2}\right)^2}{2\varepsilon} \ln\left(\frac{R/2}{\frac{3}{2}R}\right)\right)}_{}\right] =$$

$$= \left[\frac{\rho R^2}{4\varepsilon} - \frac{\rho R^2}{2\varepsilon_0} \ln\left(\frac{1}{2}\right) + \frac{\rho R^2}{8\varepsilon} \ln\left(\frac{1}{3}\right)\right]$$

$$\boxed{\begin{array}{c} V(0) - V(A)_{\text{caso B}} \\ \shortparallel \\ V(P) - V(A)_{\text{caso B}} \end{array}}$$

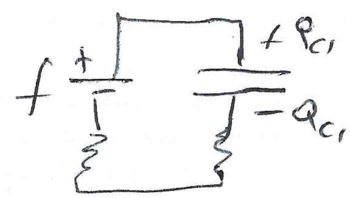
(2)

CASO A $\qquad C = \frac{Q}{V}$

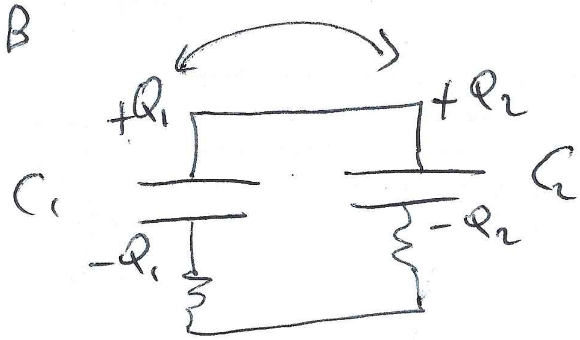
C_1 carico con tensione f

$V_{C_1} = f \qquad Q_{C_1} = C_1 f \qquad U_{IN} = \frac{1}{2} C_1 f^2 + 0$

$V_{C_2} = 0 \qquad Q_{C_2} = 0$



CASO B



la carica Q_{C_1} si distribuisce su C_1 e C_2

$$Q_{C_1} = Q_1 + Q_2$$

NON SCORRE CORRENTE A REGIME x CUI $V'_{C_1} = V'_{C_2}$

I DUE CONDENSATORI SONO IN PARALLELO
E <u>NON</u> IN SERIE $(Q_1 \neq Q_2)$

$$V_{C_1} = \frac{Q_1}{C_1} = V_{C_2} = \frac{Q_2}{C_2} \rightarrow \qquad C_{//} = C_1 + C_2$$

$$V_{C_{//}} = V_{C_1} = V_{C_2} = \frac{Q_{C_1}}{C_{//}} = \frac{Q_{C_1}}{C_1 + C_2}$$

$$U_{FIN} = \frac{1}{2} \cancel{(C_1+C_2)} \frac{Q_{C_1}^2}{(C_1+C_2)^{\cancel{2}}} = \frac{1}{2} \frac{Q_{C_1}^2}{(C_1+C_2)} = \frac{1}{2} \frac{C_1^2 f^2}{(C_1+C_2)}$$

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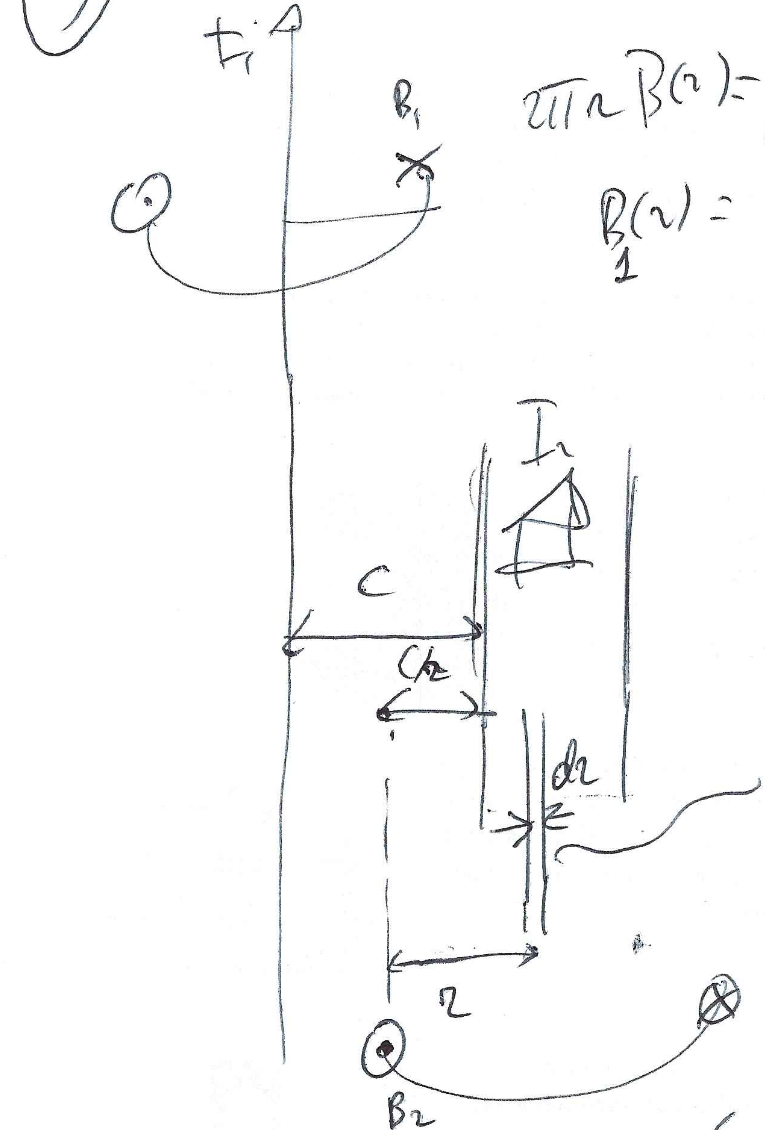


$$2\pi r B(r) = \mu_0 I_1$$

$$B_1(r) = \frac{\mu_0 I_1}{2\pi r} = B_1\left(\frac{c}{2}\right) = \frac{\mu_0 I_1}{2\pi \frac{c}{2}}$$

$$r = \frac{c}{2}$$

$$di_2 = \frac{I_2}{L}\, dr$$

$$dB_2(r) = \frac{\mu_0 I_2}{2\pi L}\frac{dr}{r}$$

$$B_2\left(\frac{c}{2}\right) = \int_{\frac{c}{2}+L}^{c/2} dB_2(r) = \frac{\mu_0 I_2}{2\pi L}\ln\left(\frac{\frac{c}{\cancel{2}}}{\frac{c+2L}{\cancel{2}}}\right)$$

$$\Sigma B = 0 \quad 2\frac{\mu_0 I_1}{2\pi c} + \frac{\mu_0 I_2}{2\pi L}\ln\left(\frac{c}{c+2L}\right) = 0$$

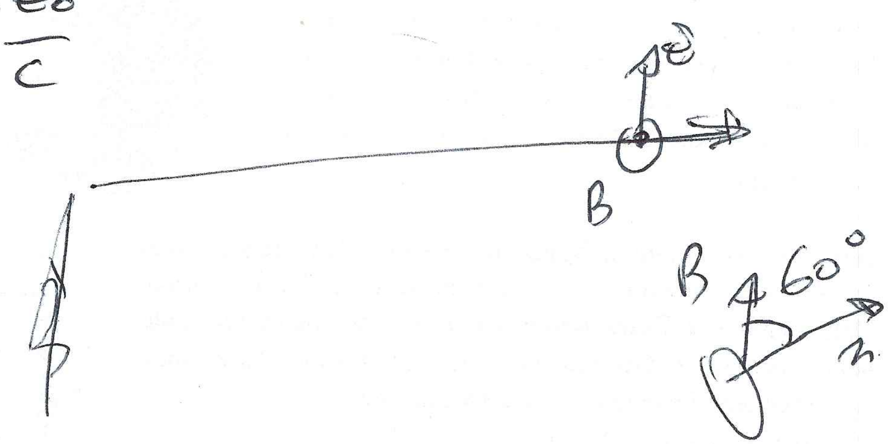
de aici I_1

(4) $\omega = 2\pi\nu$ pag 5

$$P = 4\pi D^2 I \rightarrow I = \frac{P}{4\pi D^2}$$

$$I = \frac{1}{2}\varepsilon_0 c E_0^2 \rightarrow E_0 = \sqrt{\frac{2I}{c\varepsilon_0}}$$

$$B_0 = \frac{E_0}{c}$$



$$f_{em} = -\frac{d}{dt}\Phi(B) = -\frac{d}{dt} S\cos 60° B_0 \cos(\omega t) =$$

$$= +\omega S B_0 \cos 60° \operatorname{sen}(\omega t)$$

$$f_0 = \omega S B_0 \cos 60°$$