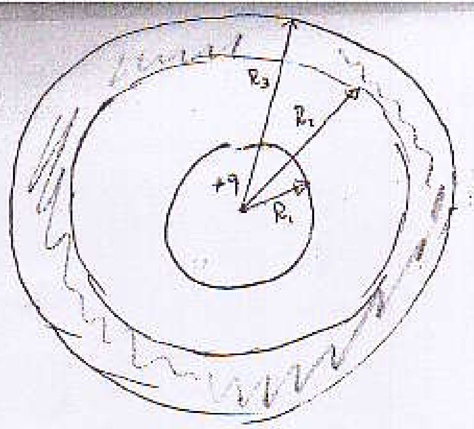


$r > R_3 \qquad \varphi(r) = \dfrac{q}{4\pi\varepsilon_0 r} = \dfrac{\sigma_3 R_3^2}{\varepsilon_0 r}$

$r = R_3 \qquad \varphi(R_3) = \dfrac{\sigma_3 R_3}{\varepsilon_0}$

$R_2 < r < R_3 \qquad \varphi(R_2) = \varphi(R_3) = \varphi(r)$

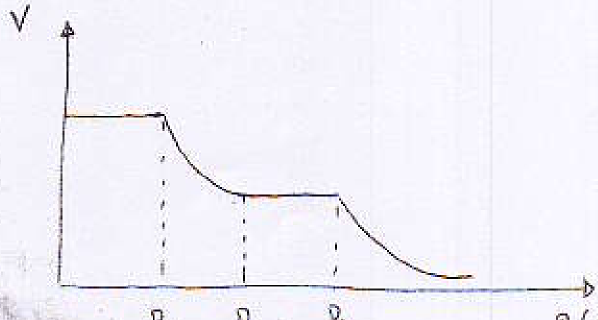
$R_1 < r < R_2 \qquad \Delta\varphi = -\displaystyle\int_{R_2}^{r} \bar{E}\cdot d\bar{l} = -\frac{1}{4\pi\varepsilon_0}\, q \int_{R_2}^{r} \frac{dr}{r^2} =$

$= \dfrac{1}{4\pi\varepsilon_0}\, \dfrac{q}{r}\Big|_{R_2}^{r} \quad \Rightarrow \Delta\varphi = \dfrac{q}{4\pi\varepsilon_0}\left(\dfrac{1}{r} - \dfrac{1}{R_2}\right)$

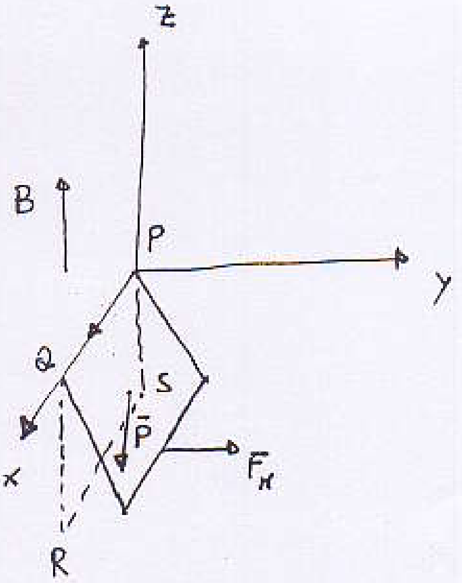
$\Rightarrow \varphi(r) - \varphi(R_3) = \dfrac{q}{4\pi\varepsilon_0}\left(\dfrac{1}{r} - \dfrac{1}{R_2}\right) \Rightarrow \varphi(r) = \dfrac{q}{4\pi\varepsilon_0}\left(\dfrac{1}{r} - \dfrac{1}{R_2}\right) + \varphi(R_3) =$

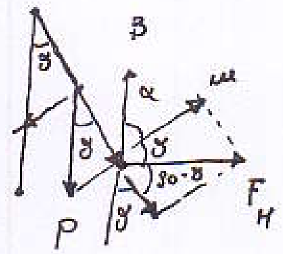
$= \dfrac{1}{\varepsilon_0}\left(\dfrac{\sigma_1 R_1^2}{r} - \sigma_2 R_2 + \sigma_3 R_3\right) \Rightarrow \varphi(R_1) = \dfrac{1}{\varepsilon_0}\left(\sigma_1 R_1 + \sigma_2 R_2 + \sigma_3 R_3\right)$

$\Rightarrow \varphi(R_1) - \varphi(R_3) = \dfrac{1}{\varepsilon_0}\left(\sigma_1 R_1 - \sigma_2 R_2\right)$



7.13





$$F_{TP} = m g \, \text{sen}\, \vartheta \Rightarrow M_P = m g \frac{b}{2} \text{sen}\, \vartheta$$

$$F_M = i a B \cos \vartheta \Rightarrow M_M = i a b B \cos \vartheta$$

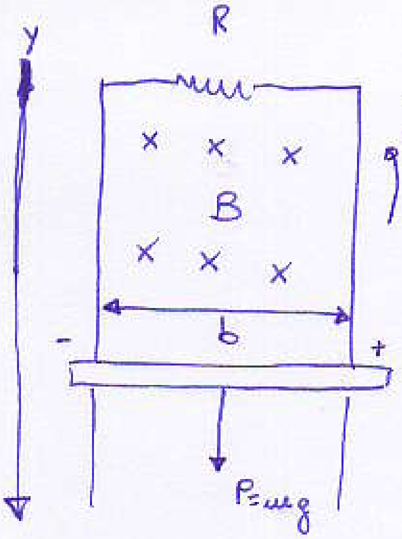
sen(90-

$$\Rightarrow M_M = \bar{m} \wedge \bar{B} \quad \text{con} \quad m = i a b \cos \vartheta$$

$$M_M = M_P \Rightarrow m g \frac{\cancel{b}}{2} \text{sen}\, \vartheta = i a \cancel{b} B \cos \vartheta$$

$$m = 2(a+b)\delta \Rightarrow i = \frac{2(a+b)\delta g \, \text{tg}\, \vartheta}{a B} = 2.12 \text{ A}$$

$$W = \int_0^{\vartheta_0} M \, d\vartheta = i a b B \int_0^{30°} \cos \vartheta \, d\vartheta = 4.2\cancel{4} \times 10^{-4} \text{ J}$$



Il campo magnetico, ortogonale al piano, può essere scelto uscente o entrante; si verifica, infatti che il risultato è sempre una forza magnetica che agisce in opposizione alla forza peso.

Considero il sistema di rif. indicato in fig.

$$\mathcal{E} = -\frac{d\phi(B)}{dt}$$

$$d\phi(B) = -B\,b\,v\,dt \Rightarrow \mathcal{E} = +B\,b\,v \Rightarrow i = \frac{Bbv}{R}$$

$$F_m = +i\vec{b} \wedge \vec{B} = -\frac{B^2b^2}{R}v$$ ~~positiva~~ negativa

$$-F_m + P = ma \Rightarrow \frac{B^2b^2}{R}v(t) - mg = m\frac{dv(t)}{dt}$$

$$\frac{dv(t)}{dt} + \frac{B^2b^2}{mR}v(t) = +g \quad , \quad k = \frac{B^2b^2}{mR}$$

$$\dot{v} + kv = +g \Rightarrow$$ ~~[illegible]~~

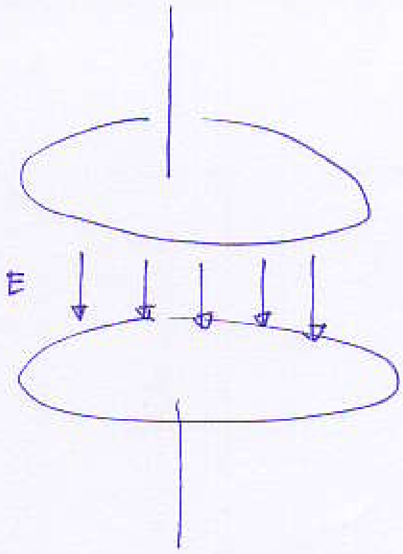
OMOG: $v_o(t) = v_0\, e^{-kt}$

SOL. PART: $v_p = \frac{g}{k}$

$$\Rightarrow v_{TOT}(t) = \frac{g}{k}\left(1 - e^{-kt}\right) \Rightarrow v_0 = \frac{g}{k}$$

$$i_0 = \frac{Bbg}{kR}$$

$$i(t) = \frac{Bb}{R}\frac{g}{k}\left(1 - e^{-kt}\right)$$



$$\int_\Gamma \bar{B} \cdot d\bar{\ell} = \mu_0 \varepsilon_0 \int \frac{\partial E}{\partial t} \cdot \bar{u}_n \, dS =$$

$$= \mu_0 \varepsilon_0 \frac{\partial \phi(E)}{\partial t}$$

$$\int_\Gamma \bar{B} \cdot d\bar{\ell} = 2 \pi r B$$

si è scelto un percorso chiuso di forma circolare e di raggio r.

$$\int \frac{\partial E}{\partial t} \cdot \bar{u}_n \, dS = \pi r^2 \frac{\partial E}{\partial t} \quad \Rightarrow \quad 2 \cancel{\pi} \cancel{r} B = \varepsilon_0 \mu_0 \cancel{\pi} r^{\cancel{2}} E_0 \, \omega \cos \omega t$$

$$\Rightarrow \quad B(r) = \frac{r \omega E_0}{2 c^2} \cos \omega t$$