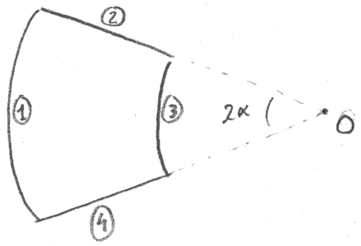
Ej. 1 –



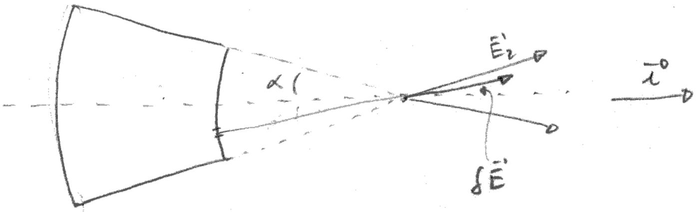
(a) $$\delta V(\vec r) = \frac{1}{4\pi\varepsilon_0}\frac{\lambda\, dl}{r}$$

$$V_{1} = \frac{1}{4\pi\varepsilon_0}\int_0^{2\alpha}\frac{\lambda\, b\, d\varphi}{b} = \frac{\lambda\alpha}{2\pi\varepsilon_0} \Rightarrow V_{3} = \frac{\lambda\alpha}{2\pi\varepsilon_0}$$

$$V_{2} = \frac{1}{4\pi\varepsilon_0}\int_a^b \frac{\lambda\, dr}{r} = \frac{\lambda}{4\pi\varepsilon_0}\ln(b/a)$$

$$\boxed{V = \frac{\lambda\alpha}{\pi\varepsilon_0} + \frac{\lambda}{2\pi\varepsilon_0}\ln(b/a)}$$

(b)



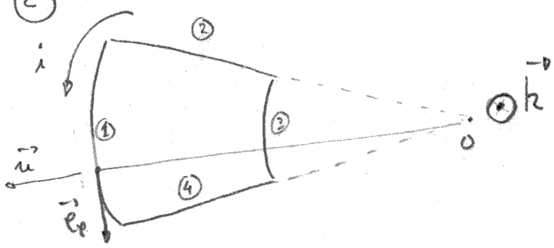
$$|\vec E_2| = \frac{1}{4\pi\varepsilon_0}\int_a^b\frac{\lambda\, dr}{r^2} = \frac{\lambda}{4\pi\varepsilon_0}\left(\left.-\frac{1}{r}\right|_a^b\right) =$$

$$= \frac{\lambda}{4\pi\varepsilon_0}\left(\frac{1}{a}-\frac{1}{b}\right)$$

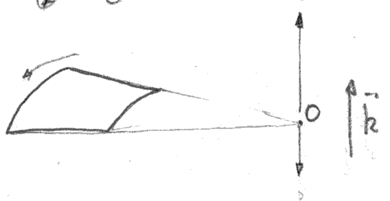
$$\delta\vec E = \frac{1}{4\pi\varepsilon_0}\frac{\lambda\, a\,\delta\varphi}{a^2}\vec e_r \;; \quad E = \frac{\lambda}{4\pi\varepsilon_0 a}\int_{-\alpha}^{+\alpha}\cos\varphi\, d\varphi = \frac{\lambda \operatorname{sen}\alpha}{2\pi\varepsilon_0 a}$$

$$\boxed{\vec E = \frac{\lambda}{2\pi\varepsilon_0}\left(\frac{b-a}{ab}\cos\alpha + \frac{b+a}{ab}\operatorname{sen}\alpha\right)\vec i}$$

(c)



$$\vec B_{2} = \vec B_{4} = 0 \quad (d\vec l \parallel \vec u)$$



$$\delta\vec B = \frac{\mu_0}{4\pi}\frac{i\, d\vec l\times\vec u}{r^2}$$

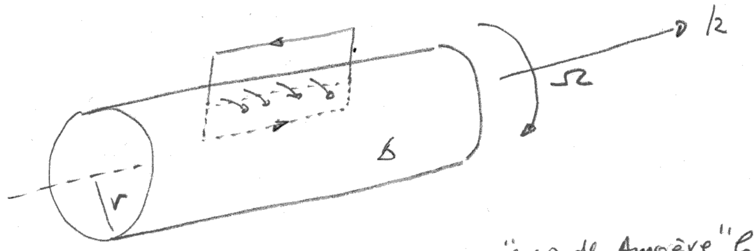
$$\vec B_{1} = \frac{\mu_0}{4\pi}\int_{-\alpha}^{+\alpha}\frac{i\, b\, d\varphi\, \vec e_\varphi\times\vec u}{b^2} = -\frac{\mu_0 i\alpha}{2\pi b}\vec k$$

$$\vec B_{3} = +\frac{\mu_0 i\alpha}{2\pi a}\vec k$$

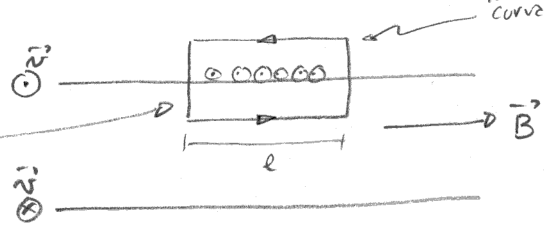
$$\boxed{\vec B = \frac{\mu_0 i\alpha}{2\pi}\left(\frac{b-a}{ab}\right)\vec k}$$

Ej 2 -

(a)



$$\oint_{\mathcal{C}} \vec{B}\cdot d\vec{l} = \mu_0 \, i$$

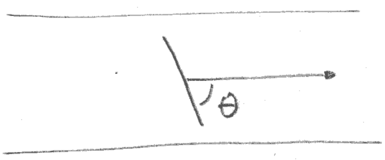


i: corr. eléctrica que atraviesa la superficie cerrada por $\mathcal{C}$.

$$\frac{dq}{dt} = \frac{\sigma l r \, d\varphi}{dt} = \sigma l r \Omega$$

$$B \cdot l = \mu_0 \sigma l r \Omega \qquad \boxed{\vec{B} = \mu_0 \sigma r \Omega \, \vec{k}}$$

(b)



$$|\varepsilon| = \frac{d\phi_B}{dt}$$

$$\phi_B = B\left(\frac{d}{2}\right)^2 \pi \operatorname{sen}\theta = \frac{\mu_0 \sigma r d^2 \pi \operatorname{sen}\theta}{4}\,\Omega$$

$$|\varepsilon| = \frac{\mu_0 \sigma r d^2 \pi \operatorname{sen}\theta}{4}\,\dot{\Omega}$$

$$i = \frac{|\varepsilon|}{R} \qquad \boxed{i = \frac{\mu_0 \sigma r d A}{4\rho}\,\dot{\Omega} \operatorname{sen}\theta} \qquad i = K\dot{\Omega}$$

$$R = \rho \frac{\pi d}{A}$$

(c)

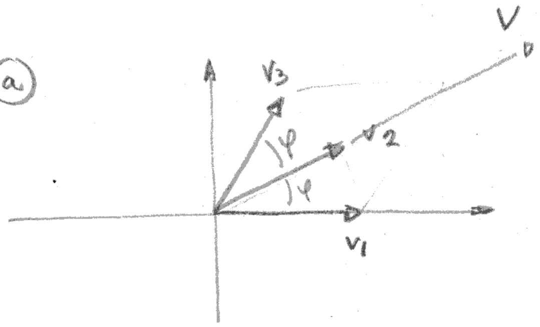
$$P(t) = R i^2 = R K^2 \Omega_m^2 \omega^2 \operatorname{sen}^2(\omega t)$$

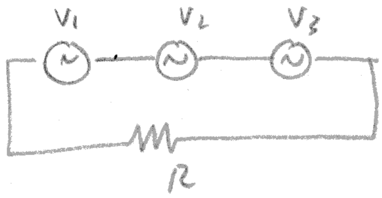
$$i = -K \Omega_m \omega \operatorname{sen}(\omega t)$$

$$\overline{P} = \rho \frac{\pi d}{A} K^2 \Omega_m^2 \omega^2 \frac{1}{2}$$

Ej3:

(a)

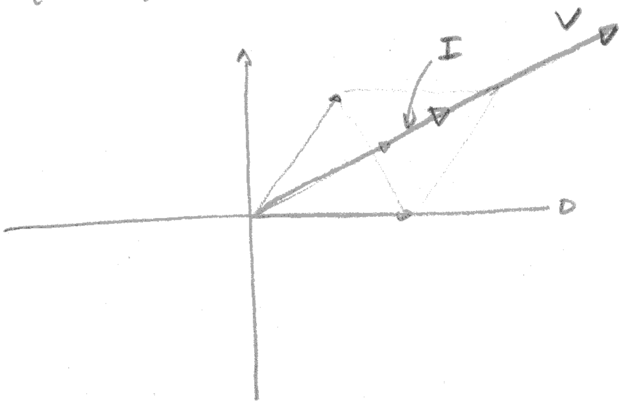




$$V = V_1 + V_2 + V_3 = (V_0 + 2V_0\cos\varphi)\cos(\omega t + \varphi)$$

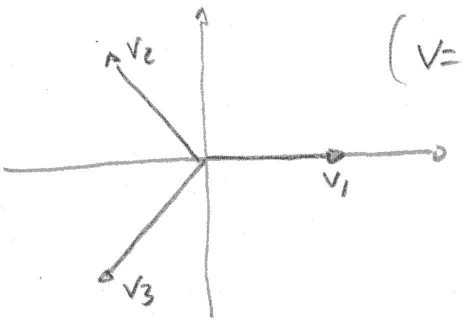
$$I(t) = \frac{V(t)}{R}$$

$$\boxed{I(t) = \frac{V_0}{R}(1 + 2\cos\varphi)\cos(\omega t + \varphi)}$$

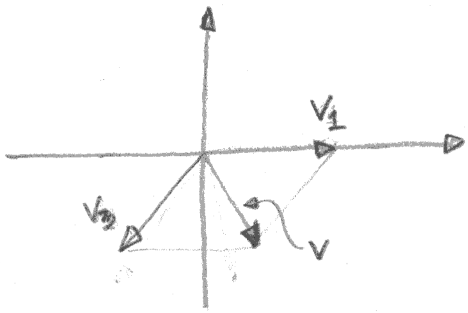


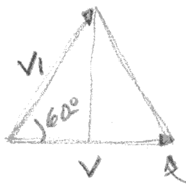
(b) Si $\varphi = 120^\circ \Rightarrow I = 0$

$(V = 0)$



(c)





$V = 2V_0\cos 60^\circ = V_0$

triángulo equilátero

$$\boxed{V = V_0\cos(\omega t - \varphi/2)}$$

$$\boxed{I_a(t) = \frac{V_0}{R}\cos(\omega t - \varphi/2)}$$

(d) $$\boxed{I_b(t) = \frac{V_0}{R}\cos(\omega t)}$$