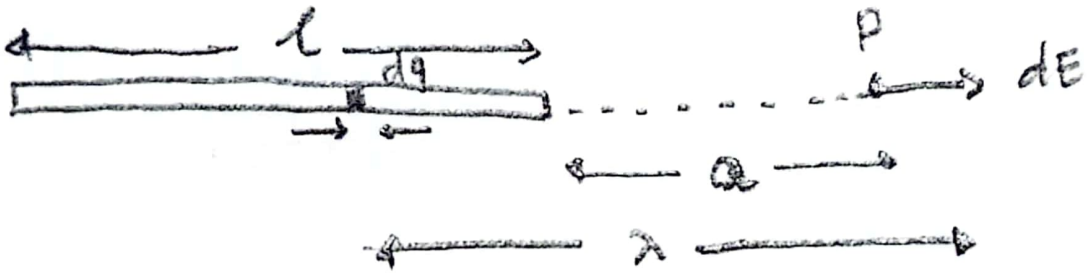
② Dik : L = Batang Panjang

λ : Rapat muatan / satuan panjang

Dit : a. Medan di P berjarak a diatas ujung.

b. Medan di P berjarak a ditengah" kawat



Elemen sebuah panjang dx pada jarak x dari titik P, muatan pada elemen ini = $dq = \lambda dx$

ⓐ Medan di P

$$dE = \frac{k\,dq}{x^2}$$

$$dE = \frac{k\lambda\,dx}{x^2}$$

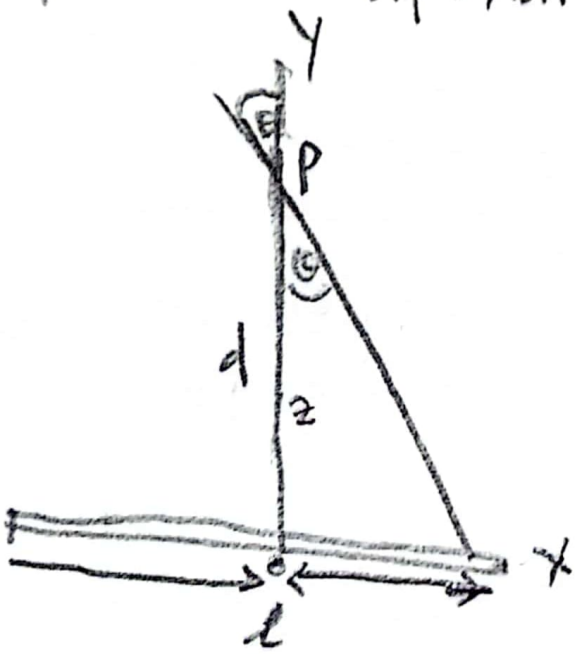
$$E = \int_a^{l+a} \frac{k\lambda}{x^2}\,dx \Rightarrow E = k\lambda\left[\frac{-1}{x}\right]_a^{l+a}$$

$$E = k\lambda\left(\frac{1}{a} - \frac{1}{l+a}\right) \Rightarrow E = \frac{k\lambda l}{a(a+l)}$$

total muatan pada batang $= Q = \lambda l$ jadi $E = \frac{kQ}{a(a+l)}$

(b) medan p di titik bergerak z di tengah kawat.

diferensial : $dq = \lambda dl$



medan listrik di titik p

Setiap elemen panjang dll. adalah-

$$dE = \frac{k_0\, dq}{u^2 + d^2}$$

$$E_u = \int dE_u = 0$$

$$dq = \lambda du$$

$$E = E_y = \int dE_y = \int dE \cos\theta$$

$$\cos\theta = \frac{y}{\sqrt{u^2 + d^2}}$$

$$E = 2k_e \lambda d \int_0^{l/2} \frac{du}{(u^2 + d^2)^{3/2}}$$

$$= \frac{2k_e \lambda \sin\theta_0}{d}$$

$$\sin\theta_0 = \frac{l/2}{\sqrt{\frac{l^2}{2} + d^2}}$$

$$\theta_0 = 90^\circ$$

$$E_y = \frac{2k_e \lambda}{d}$$

③ Dik : rapat muatan = σ Dit. E = ... ?
jari - jarri : R

Jwb :

$$\lambda = \frac{Q}{4\pi R^2}$$

→ muatan total pada Rapat muatan

$$\lambda 4\pi R^2 = Q$$

Medan listrik

$$E = \frac{Q}{4\pi\varepsilon_0 r^2}$$

$$E = \frac{\lambda 4\pi R^2}{4\pi\varepsilon_0 r^2}$$

$$E = \frac{\lambda R^2}{\varepsilon_0 r^2}$$

④ Dik : $E = kr^3\hat{r_0}$

k = konstan.

Dit : a. Rapat muatan ? b. muatan total

Jwb : $\vec{\nabla} \cdot \vec{E} = \rho/\varepsilon_0$

(a) $\rho = \varepsilon_0 (\vec{\nabla} \cdot \vec{E}) \rightarrow i$

$$V \cdot A = \frac{1}{fgh}\left[\frac{\gamma}{\sigma u}(ghR_t) + \frac{\gamma}{\gamma v}(fhA_v) + \frac{\gamma}{\gamma w}(fgA_w)\right]$$

~~$\vec{\nabla} \cdot \vec{E} = \frac{1}{\varepsilon_0}$~~

$$\vec{\nabla}\cdot\vec{\varepsilon} = \frac{1}{r^2\sin\theta}\left[\frac{\partial}{\partial r}\left(r^2\sin\theta\,\varepsilon_r\right)\right]$$

$$\vec{\nabla}\cdot\vec{\varepsilon} = \frac{1}{r^2\sin\theta}\sin\theta\,\frac{\partial}{\partial r}\left(r^2 E_r\right)$$

$$\vec{\nabla}\cdot\vec{\varepsilon} = \frac{1}{r^2\sin\theta}\sin\theta\left(\frac{\partial}{\partial r}\left(r\,k\,r^3 r\right)\right)$$

$$\rho = \varepsilon_0\left(5k r^2\right) \Rightarrow \rho = 5k\varepsilon_0 r^2$$

(b) $$\int \vec{E}\cdot d\vec{a} = \frac{Q}{\varepsilon_0}$$

$$\Rightarrow Q = \varepsilon_0 \int \vec{E}\cdot d\vec{a} = \varepsilon_0 \oint E\,da$$

$$\Rightarrow Q = \varepsilon_0 E \int da$$

$$\Rightarrow Q = \varepsilon\, E\, 4\pi R^2$$

$$Q = 4\pi\varepsilon_0 R^2 (kR^3)$$

$$Q = 4\pi\varepsilon_0 R^5 k$$

$$Q = 4\pi\varepsilon_0 R^5$$ //

(5)
(1)

soal nomer 1 dan 5 berantakan pak,

Terimakasih.