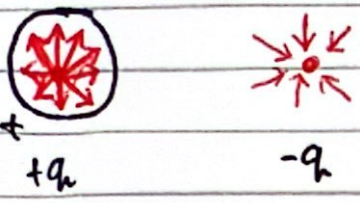
No.

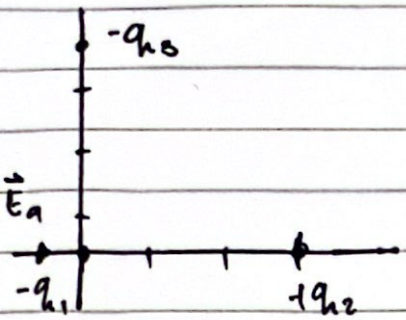
Date

Kalismo

Nama : Jennita Yuliana
NPM : 2218022075

Medan listrik ($\vec{E}$)





$\rightarrow \vec{E}_1 : \frac{\Sigma \vec{F}}{q_1}$

$: \frac{Fa_3}{q_1} + \frac{Fq_2}{q_1}$

$\vec{E} : k\frac{q_3}{r^2} + k\frac{q_2}{r^2}$

1. $\vec{E} : \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r}$

$: k\frac{q}{r^2}\hat{r}_0$ → oleh muatan deskrit → tidak saling berhubungan

2. $\vec{E} : \frac{1}{4\pi\varepsilon_0}\int \frac{\lambda dl}{r^2}\hat{r}_0$ → $q : \lambda l$ → muatan terdistribusi pada penggaris

λdl

3. $\vec{E} : \frac{1}{4\pi\varepsilon_0}\iint \frac{\delta dq}{r^2}\hat{r}_0$ → Luas Permukaan.

4. $\vec{E} : \frac{1}{4\pi\varepsilon_0}\iiint \frac{\rho dv}{r^2}\hat{r}_0$

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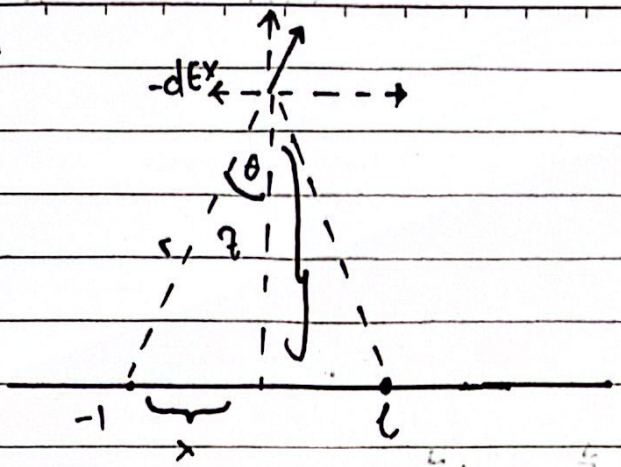
Contoh :



$r = (x^2 + z^2)^{\frac{1}{2}}$

$d\vec{E} = dEy + dEx$

$d\vec{E} = dEy$

$dEy = dE \cos\theta$

$$E = \frac{1}{4\pi\varepsilon_0} \int_0^L \frac{\lambda dl}{r^2} \cos\theta$$

$$= \frac{2}{4\pi\varepsilon_0} \int_0^L \frac{\lambda dx}{(x^2+z^2)} \cos\theta$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0} \int_0^L \frac{\lambda dx}{(x^2+z^2)} \cos\theta \quad \rightarrow = \frac{x}{z^2\sqrt{x^2+z^2}}$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0} \int_0^L \frac{dx}{(x^2+z^2)^{3/2}}$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0} \left[\frac{dx}{(x^2+z^2)^{3/2}} \right] \Big|_0^L$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0} \left[\frac{l}{z^2\sqrt{l^2+z^2}} - \frac{0}{z^2\sqrt{0+z^2}} \right]$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0} \left[\frac{l}{z^2\sqrt{l^2+z^2}} \right]$$

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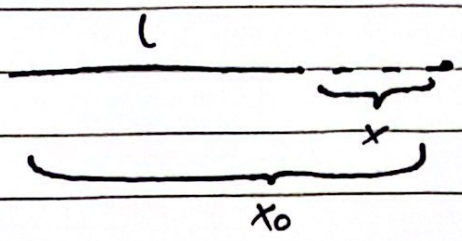


$$\vec{E} = \frac{1}{4\pi\varepsilon_0}\lambda\int_0^L \frac{x\,dx}{(x_0-x)^2}$$

$$\vec{E} = \frac{1}{4\pi\varepsilon_0}\lambda\int_0^L (x_0-x)^{-2}\,dx$$

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[(x_0-x)^{-1}\Big|_0^L\right]$$

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\left(\frac{1}{x_0-x}\right)\Big|_0^L\right]$$

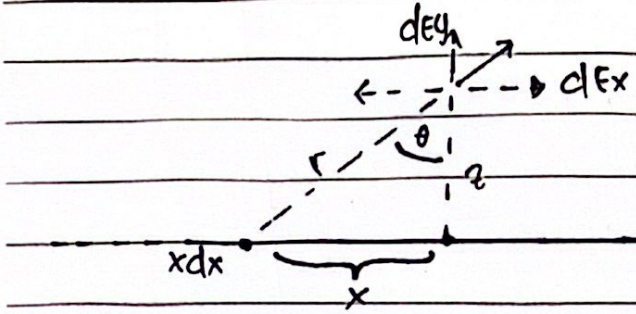
$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\frac{1}{(x_0-l)} - \frac{1}{(x_0-0)}\right]$$

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\frac{x_0-(x_0-l)}{x_0(x_0-l)}\right]$$

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\frac{l}{x_0(x_0-l)}\right]$$

kali kesini — kali kesini

(x_0-l) ⟷ (x_0-0) dikali



$$\vec{E} = \vec{E}_x + \vec{E}_y$$

$$\vec{E} = \frac{1}{4\pi\varepsilon_0}\int_{-\infty}^{\infty}\frac{\lambda\,dx}{r^2}\cos\theta$$

$\cos\theta = \frac{z}{r} \rightarrow r = \frac{z}{\cos\theta}$

$\text{tangen}\,\theta = \frac{x}{z}$, $x = z\,\text{tangen}\,\theta$

$dx = \frac{z}{\cos^2\theta}$ → $x = -\infty$, $\theta = -\pi/2$

$x = \infty \rightarrow \theta =$

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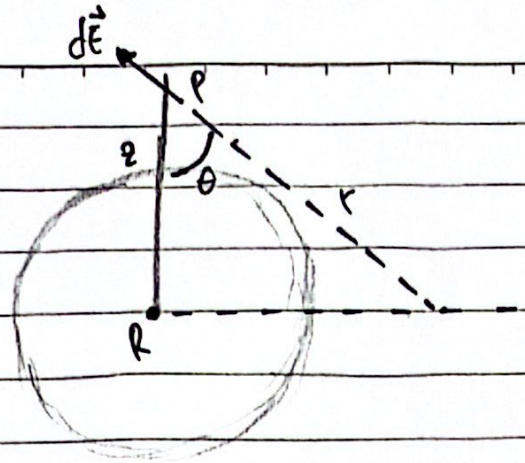

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \int_0^{2\pi R} \frac{z\,dl}{(z^2+R^2)^{3/2}}$$

$$= \frac{z\lambda}{4\pi\varepsilon_0 (z^2+R^2)^{3/2}} \int_0^{2\pi R} dl$$

$$= \frac{z\lambda}{4\pi\varepsilon_0 (z^2+R^2)^{3/2}} (l)\Big|_0^{2\pi R}$$

$$= \frac{z\lambda}{4\pi R\varepsilon_0 (z^2+R^2)^{3/2}} (2\pi R)$$