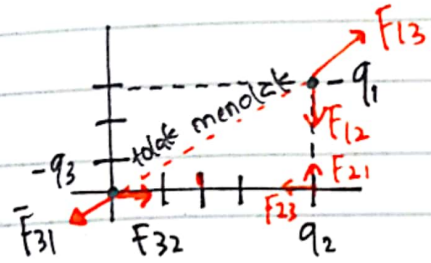
Senin, 18 Maret 2024

Carilah gaya dari $-q_1$



Gaya yang dialami oleh q_3

$$\vec{F}_{31} = \frac{1}{4\pi\varepsilon_0} \frac{q_3 q_1}{5^2} \left(\frac{-4\hat{i} - 0\hat{j}}{5} \right)$$

$$\vec{F}_{32} = \frac{1}{4\pi\varepsilon_0} \frac{q_3 q_2}{4^2} \hat{i}$$

$$\vec{F}_{12} = k \frac{q_1 \cdot q_2}{3^2} \left(\frac{0\hat{i} - 3\hat{j}}{3} \right)$$

$$F_{12} = -k \frac{q_1 \cdot q_2}{3^2} \hat{j}$$

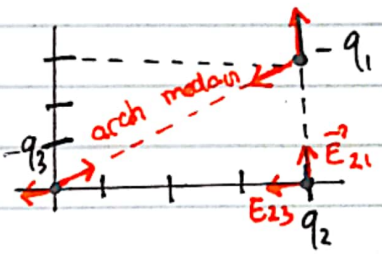
$$\vec{F}_{13} = k \frac{q_1 \cdot q_3}{5^2} \left(\frac{4\hat{i} + 3\hat{j}}{5} \right)$$

Gambar Gaya yang dialami q_2

$$\vec{F}_{21} = k \frac{q_2 \cdot q_1 \hat{j}}{3^2}$$

$$\vec{F}_{23} = k \frac{q_2 \cdot q_3}{4^2} (-\hat{i})$$

MEDAN



$$\vec{E}_{32} = \frac{F}{q_3} = k \frac{q_3 \cdot q_2 / F^2}{q_3}$$

$$= k \frac{q_2}{F_2}$$

$$\vec{E}_{31} = k \frac{q}{5^2} \left(\frac{4\hat{i} + 3\hat{j}}{5} \right)$$

$$\vec{E}_{32} = k \frac{q_2}{4^2} (-\hat{i})$$

$$\vec{E}_{21} = \frac{F}{q_2} = k \frac{q_2 \cdot q_1 / F}{q_2}$$

$$= k \frac{q_1}{F}$$

Muatan Diskrit

① $E = k\frac{q}{r^2}$

$= k\sum_{i=1}^{n}\frac{q_i}{r_i^2}\hat{r}_{oi}$

② Panjang penggaris

$\vec{E} = k\int \frac{dq}{r^2}\hat{r}_o$

$= k\int \frac{\lambda\, dx}{r^2}\hat{r}_o \rightarrow$ medan kawat

③ 

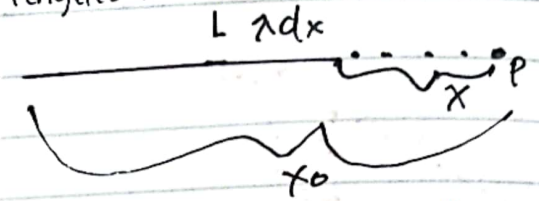
$\vec{E} = k\iint \frac{\sigma dq}{r^2}\hat{r}_o$

④ 

$E = k\iiint \frac{\rho d\tau}{r^2}\hat{r}_o$

contoh soal :

Penyelesaian :



$\vec{E_P} = ?$

$\vec{E} = k\int_0^L \frac{x\,dx}{(x_0-x)^2} = k\lambda\int \frac{dx}{(x_0-x)^2}$

$\int \frac{dx}{x^2} = \int_0^L x^{-2}dx$

$= x^{-1}\Big|_0^L$

$= \frac{1}{x}\Big|_0^L$

$k\lambda\int \frac{dx}{(x_0-x)^2} = k\lambda\int_0^L (x_0-x)^{-2}dx$

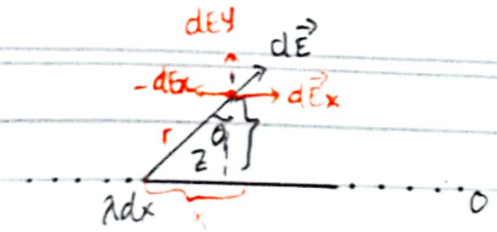
$= k\lambda\left[\frac{1}{(x_0-x)}\Big|_0^L\right]$

$= k\lambda\left[\frac{1}{(x_0-L)} - \frac{1}{(x_0-0)}\right]$

$= k\lambda\left[\frac{x_0-(x_0-L)}{x_0(x_0-L)}\right]$

$= k\lambda\,\frac{L}{x_0(x_0-L)}$

(2.)



$$d\vec{E} = d\vec{E}y + d\vec{E}x$$

$$dE = d\vec{E}y$$

$$dEy = dE\cos\theta \qquad dq = \lambda dx$$

$$E = k\int_{-\infty}^{\infty} \frac{\lambda dx}{r^2}\cos\theta$$

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

misal : $r = \frac{z}{\cos\theta}$

$$tg\theta = \frac{x}{z}$$

$$x = z\,tg\theta$$

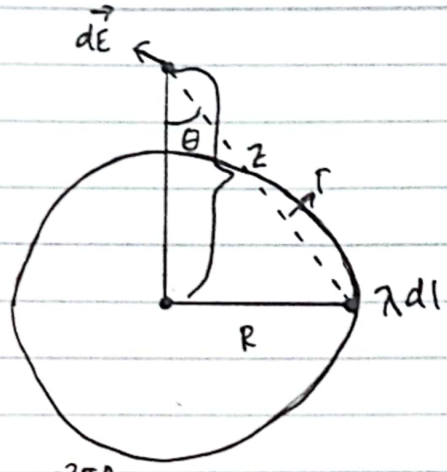
$$\hookrightarrow dx = \frac{z}{\cos^2\theta}$$

$x = -\infty$

$\theta = -\frac{\pi}{2}$

$x = \infty$

$\theta = \frac{\pi}{2}$



$$E = k\int_0^{2\pi R} \frac{\lambda dl}{(R^2+z^2)}\cos\theta \qquad \cos\theta = \frac{z}{r}$$

$$r = (z^2+R^2)^2$$

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

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