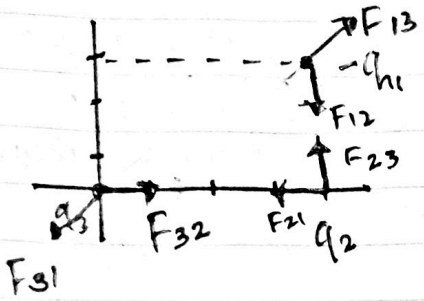
Nama : Leni Maulina
NPM : 2213022022

No. 18/2024
Date 3

Contoh :



$$\vec{F}_{31} = \frac{1}{4\pi\varepsilon_0} \frac{q_3 \cdot q_1}{5^2} \left(\frac{-4\hat{i} - 3\hat{j}}{5} \right)$$

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

$$F_{12} = \frac{1}{4\pi\varepsilon_0} \frac{q_1 \cdot q_2}{r^2} \left(\frac{0\hat{i} - 3\hat{j}}{3} \right)$$

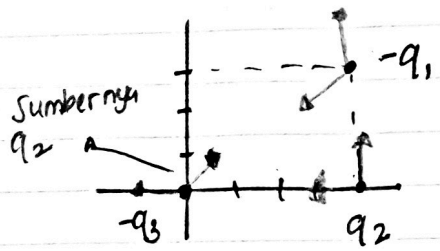
$$= \frac{1}{4\pi\varepsilon_0} - k \cdot \frac{q_1 \cdot q_2}{3} \cdot \hat{j}$$

$$F_{13} = \frac{1}{4\pi\varepsilon_0} \frac{q_1 \cdot q_3}{r^2} \left(\frac{4\hat{i} + 3\hat{j}}{5} \right)$$

$$F_{23} = \frac{1}{4\pi\varepsilon_0} \frac{q_2 \cdot q_3}{4^2} \left(\frac{4\hat{i} - 0\hat{j}}{4} \right) = -k \frac{q_2 \cdot q_3}{4^2} \hat{i}$$

$$F_{21} = \frac{1}{4\pi\varepsilon_0} \frac{q_2 \cdot q_1}{3^2} \left(\frac{0\hat{i} + 3\hat{j}}{3} \right) = k \frac{q_2 \cdot q_2}{3^2} \hat{j}$$

Medan



karena sumbernya q_2, maka q_3 menjauhi q_2. Sedangkan pada $-q_1$ mendekati. negatif akan menuju, positif akan menjauh.

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

$$= k\,\frac{q_2}{r^2}$$

$$\vec{E}_{31} = k\,\frac{q_1}{5^2}\left(\frac{4\hat{i}+3\hat{j}}{5}\right)$$

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

Medan pada q_2

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

$$= k\,\frac{q_1}{3^2}(\hat{j}).$$

$$\vec{E}_{12} = \frac{F_{12}}{q_1} = \frac{-k\, q_1\, q_2 / -3 \cdot \hat{j}}{q_1}$$

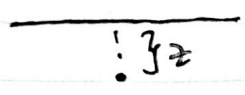
$$= -k\,\frac{q_2}{3}\,\hat{j}$$

→ Muatan Non Diskrip → hanya berlaku untuk medan.

1) $E = k\frac{q}{r^2}\hat{r}_{oi}$

$= k\sum_{i=1}^{2}\frac{q_1}{r_i^2}\hat{r}_{oi}$

$= k\left[\sum_{i=1}^{n}\frac{q_1}{r_1^2}\hat{r}_{o1} + \frac{q_2}{r_2^2}\hat{r}_{o2} + \cdots + \frac{q_n}{r_n^2}\hat{r}_{on}\right]$

2) 

$E = k\int\frac{dq}{r^2}\hat{r}_o = k\int\frac{\lambda dx}{r^2}\hat{r}_o$ → Medan pada kawat lurus

3) 

$E = k\iint\frac{\sigma da}{r^2}\hat{r}_o$ → Luasan

4) 

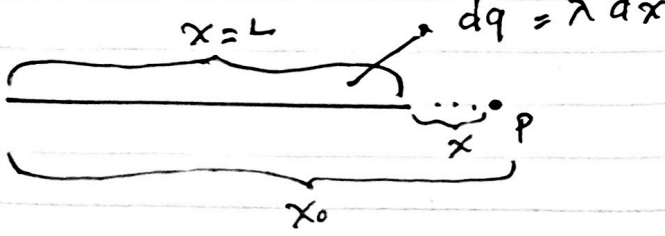
$E = k\iiint\frac{\rho dr}{r^2}\hat{r}_o$

→ $\vec{E} = (\ )\,q_1$
→ $\vec{E} = \int(\ )\,\lambda\,dl$
→ $\vec{E} = \iint(\ )\,\sigma\,da$
→ $E = \iiint(\ )\,\rho\,d\vec{v}$

$\frac{k}{r^2}$

Contoh Soal !

1)



$\vec{E}_p = ?$

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

$$= k\int \frac{\lambda\, dx}{r^2}$$

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

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

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

$$E = k\lambda \left\{\frac{1}{x_0 - L} - \frac{1}{x_0 - 0}\right\}$$

$$E = k\lambda \left\{\frac{1}{x_0 - L} - \frac{1}{x_0}\right\}$$

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

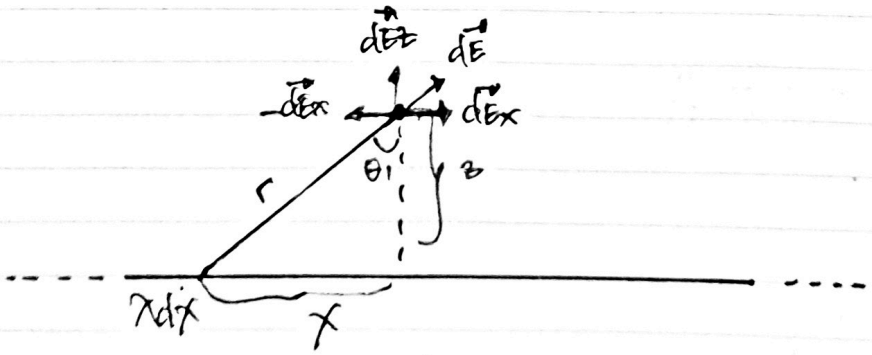
$$E = k\lambda \frac{L}{x_0(x_0 - L)}$$

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

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

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

2)



$$\vec{dE} = \vec{dE_y} + \vec{dE_x}^{\,0}$$

$$\vec{dE} = \vec{dE_y}$$

$$\vec{dE} = dE\cos\theta \qquad dy = \lambda\, dx$$

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

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

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

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

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

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

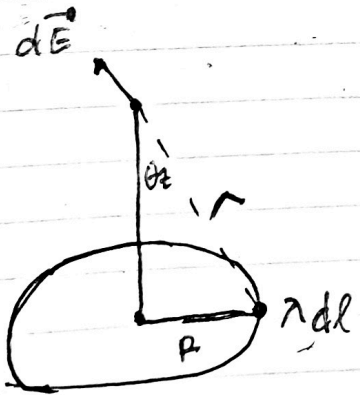
$x = -\infty$

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

$x = \infty$

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

3)



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

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

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

$\frac{z}{r}$

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

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