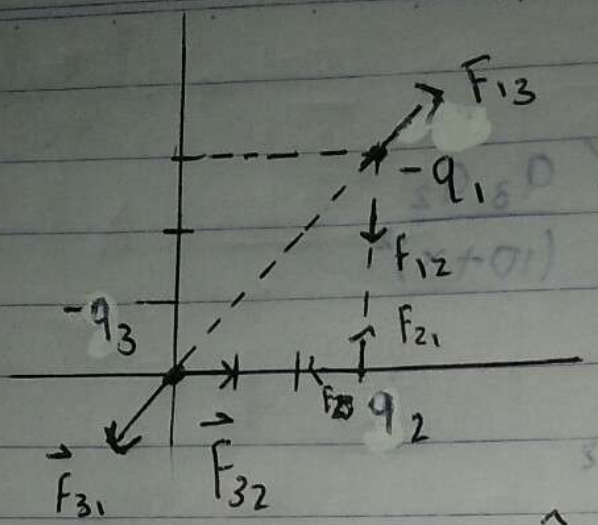
Pepy liana Sari
2213022028

No. 18 - Maret - 2024
Date : Senin



$$\vec{F}_{31} = \frac{1}{4\pi\varepsilon_0} \frac{q_3 \cdot q_2}{5^2} \left(\frac{-4\hat{i} - 3\hat{j}}{5} \right)$$

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

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

$$\vec{F}_{12} = -k \frac{q_1 q_2}{3^2} \hat{j}$$

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

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

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

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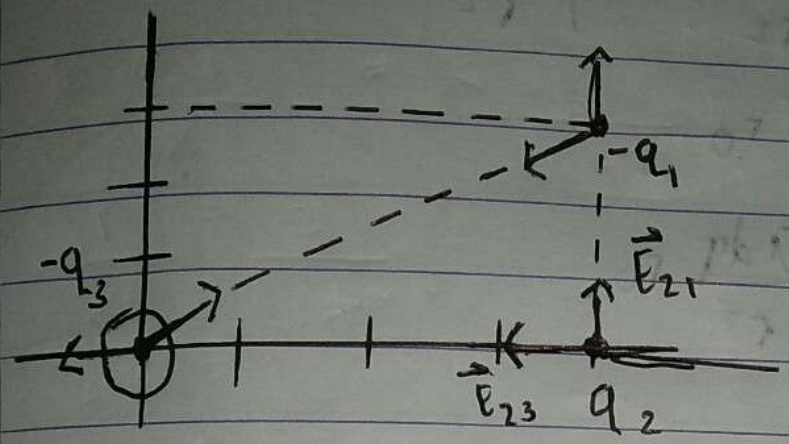
Medan.



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

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

$$\vec{E}_3 = k\,\frac{q}{5^2}\left(\frac{4\hat{i}+3\hat{j}}{5}\right)$$

$$\vec{E}_3 = k\,\frac{q_2}{4^2}\left(-\hat{i}\right)$$

Medan Non Listrik

① $$E = k\,\frac{g}{r^2}\hat{r}$$

$$= k\sum_{i=1}^{n}\frac{g_i}{r_1^2}\hat{r}_{01}$$

$$= k\left[\sum_{i=1}^{n}\frac{g_1}{r_1^2}\hat{r}_{01} + \frac{g_2}{r_2^2}\hat{r}_{02} + \cdots + \frac{g_4}{r_4^2}\hat{r}_{04}\right)$$

$$\sum_{i=1}$$

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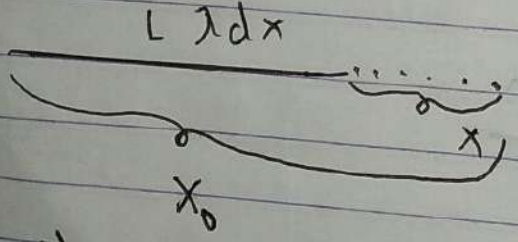
② $\vec{E} = k \int \frac{dq}{r^2} = k \int \frac{\lambda dx}{r^2}$

③ $\vec{E} = k \iint \frac{\lambda \, dq}{r^2} r_0$

④ $\vec{E} = k \iiint \frac{\lambda \, dq}{r^2} r_0$

Contoh Penerapan muatan terdistribusi pada suatu bahan.

①. Muatan terdistribusi pada garis dengan panjang tertentu (L), Muatan seragam Q tersebar di sepanjang garis yang panjang L, terletak pada sepanjang sumbu x dari $x = 0$ sampai $x = L$. densitas muatannya adalah $Q = \lambda L$. hitung medan listrik pada titik P yang terletak pada $x_0 > L$!



$\vec{E}_P = ?$

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

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

$$= x\Big|_0^L$$

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

Atau:

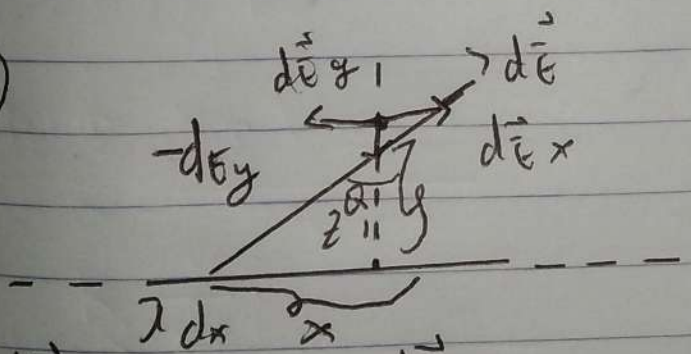
$$= k\lambda \int_0^L (x_0 - x)^{-2}\,dx$$

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

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

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

②



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

$$d\vec{E} = d\vec{E}_y$$

$$d\vec{E}_y = dE \cos\theta$$

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

$$dq = \lambda\, dx$$

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

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

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

$x = z\,\mathrm{Arg}\,\theta$

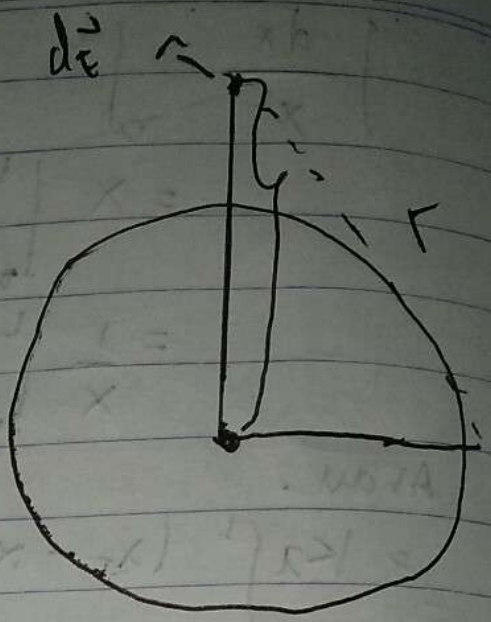
$dx = \frac{z}{\cos^2\theta}$

$x = -\infty$

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

$x = \infty$

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



$\vec{E} = K \int_0 \frac{\pi\, dx}{(r^2+z^2)} \cos\theta$

$K\pi z \int \frac{dl}{(\theta^2+z^2)^{3/2}} \rightarrow \frac{z}{r}$

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

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