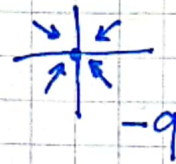
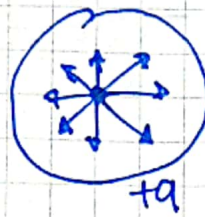


Listrik & Kemagnetan.

18-03-2024

$$1. \vec{E} = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} \hat{r}$$

$$= k \frac{q}{r^2} \hat{r} \rightarrow \text{Oleh muatan diskrit}$$



$$2. \vec{E} = \frac{1}{4\pi\epsilon_0} \int \frac{x \, dq}{r^2} \hat{r} \rightarrow q = x \cdot l \rightarrow \text{muatan terdistribusi pada Penggaris.}$$

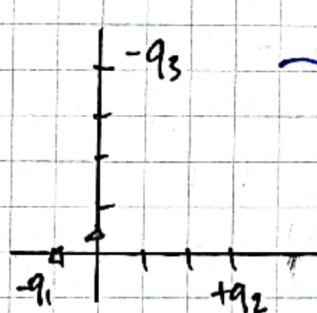
$$3. \vec{E} = \frac{1}{4\pi\epsilon_0} \iint \frac{\sigma \, dA}{r^2} \hat{r}$$

 Luas Permukaan

$$4. \vec{E} = \frac{1}{4\pi\epsilon_0} \iiint \frac{\rho \, dV}{r^2} \hat{r}$$

$\vec{E} = \sum \vec{E}$

$$= \frac{Fq_3}{q_1} + \frac{Fq_2}{q_1}$$

$$= k \frac{q_3}{r^2} + k \frac{q_2}{r^2}$$


Contoh:

$$d\vec{E} = dE_x + dE_y$$

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

$$dE_y = dE \cos \theta$$

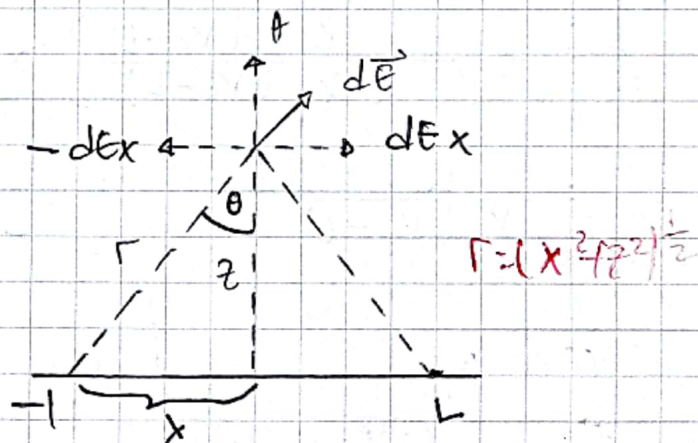
$$\vec{E} = \frac{1}{4\pi\epsilon_0} \int_{-L}^L \frac{x \, dx}{r^2} \cos \theta$$

$$= \frac{2}{4\pi\epsilon_0} \int_0^L \frac{x \, dx}{(x^2 + z^2)^{3/2}}$$

$$= \frac{2}{4\pi\epsilon_0} \int_0^L \frac{dx}{(x^2 + z^2)^{3/2}}$$

$$\int \frac{dx}{(x^2 + z^2)^{3/2}} = \frac{x}{z^2 \sqrt{x^2 + z^2}}$$

$$= \frac{2z}{4\pi\epsilon_0} \left(\frac{x}{z^2 \sqrt{x^2 + z^2}} \right) \Big|_0^L$$



$$= \frac{2\lambda z}{4\pi\epsilon_0} \left[\frac{1}{z^2\sqrt{x^2+z^2}} - \frac{0}{z^2\sqrt{0+z^2}} \right]$$

$$= \frac{2\lambda z}{4\pi\epsilon_0} \left[\frac{L}{z^2\sqrt{L^2+z^2}} \right]$$

Contoh :

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \int_0^L \frac{x dx}{(x_0-x)^2} \quad \text{di puter & diturunkan 1}$$

$$= \frac{1}{4\pi\epsilon_0} x \int_0^L (x_0-x)^{-2} dx$$

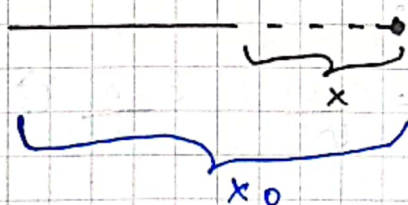
$$= \frac{1}{4\pi\epsilon_0} \left((x_0-x)^{-1} \right) \Big|_0^L$$

$$= \frac{1}{4\pi\epsilon_0} \left(\frac{1}{(x_0-x)} \right) \Big|_0^L$$

$$= \frac{1}{4\pi\epsilon_0} \left(\frac{1}{(x_0-L)} - \frac{1}{(x_0-0)} \right)$$

$$= \frac{1}{4\pi\epsilon_0} \left[\frac{x_0 - (x_0-L)}{x_0(x_0-L)} \right]$$

$$= \frac{L}{x_0(x_0-L)}$$



Untuk memper jalan ini gunakan

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

$$= \left(x^{-1} \right) \Big|_0^L$$

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

Lat rumus agar sama dibuku

Contoh 3

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \int_0^{2\pi R} \frac{z x dl}{(z^2+R^2)^{3/2}}$$

~~ini~~

$$= \frac{z x}{4\pi\epsilon_0 (z^2+R^2)^{3/2}} \left(l \right) \Big|_0^{2\pi R}$$

$$= \frac{z x}{4\pi\epsilon_0 (z^2+R^2)^{3/2}} \int_0^{2\pi R} dl$$

$$= \frac{z x}{4\pi\epsilon_0 (z^2+R^2)^{3/2}} L \Big|_0^{2\pi R}$$

$$= \frac{z x}{4\pi\epsilon_0 (z^2+R^2)^{3/2}} (2\pi R - 0) = \frac{z x}{4\pi\epsilon_0 (z^2+R^2)^{3/2}} 2\pi R$$

