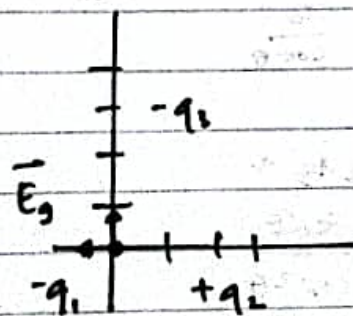
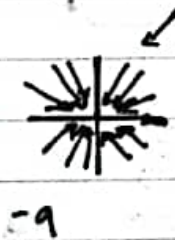
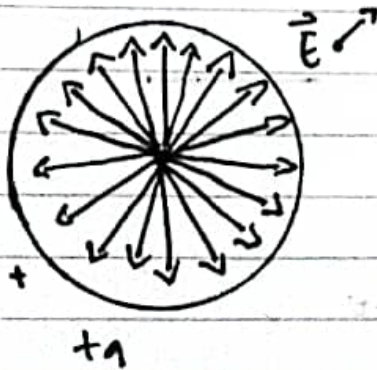


Senin
18 Maret 2024

Medan listrik ($\vec{E}$)



$$\vec{E}_i = \frac{\sum \vec{F}}{q_i}$$

$$= \frac{F_{q1}}{q_i} + \frac{F_{q2}}{q_i}$$

$$\vec{E} = k \frac{q_1}{r^2} + k \frac{q_2}{r^2}$$

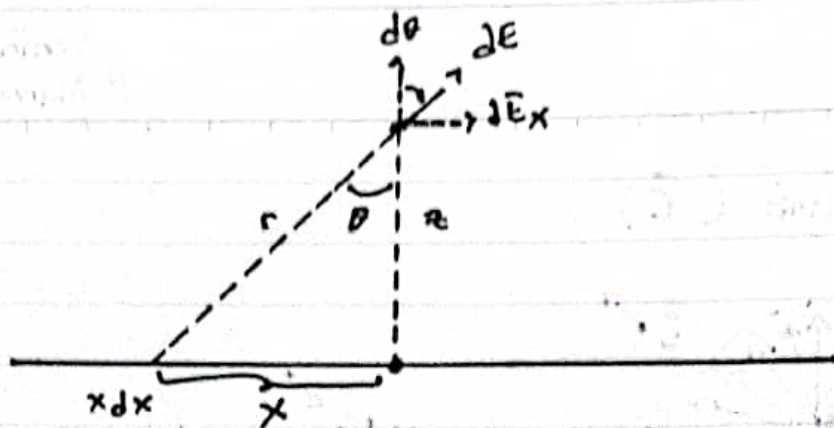
$$\textcircled{1} \vec{E} = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} \hat{r}$$

$$= k \frac{q}{r^2} \hat{r}_0 \rightarrow \text{oleh muatan diskrit}$$

$$\textcircled{2} \vec{E} = \frac{1}{4\pi\epsilon_0} \int \frac{\lambda dr}{r^2} \hat{r} \rightarrow q = \pi l \rightarrow \text{muatan terdistribusi pada pita garis}$$

$$\vec{E} = \left[\frac{\lambda z}{4\pi\epsilon_0} \right] \left(\frac{x}{z^2 \sqrt{x^2 + z^2}} \right) \Big|_0^L = \left[\frac{1}{z^2 \sqrt{L^2 + z^2}} - \frac{0}{z^2 \sqrt{0 + z^2}} \right]$$

$$= \left[\frac{1}{z^2 \sqrt{L^2 + z^2}} \right]$$



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

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \int \frac{x dx}{r^2} \cos\theta$$

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

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

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

$$= \frac{2}{4\pi\epsilon_0} \int \frac{x dx}{(x^2 + z^2)} \cos\theta$$

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

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

$$E_0 = \frac{2\pi z}{4\pi\epsilon_0} \left(\frac{x}{z^2 \sqrt{x^2 + z^2}} \right) \Big|_0^L = \frac{1}{z^2} \left[\frac{L}{\sqrt{L^2 + z^2}} - \frac{0}{\sqrt{0^2 + z^2}} \right]$$

$$= \frac{1}{z^2} \left[\frac{L}{\sqrt{L^2 + z^2}} \right]$$