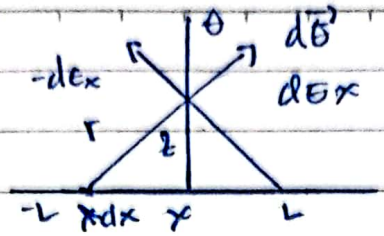
No. 18-03-2024

Date . .

Lutfiah marsdah (2213022086

Contoh



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

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

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

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

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \int_{-L}^{L} \frac{\lambda\, dL}{r^2} \cos\theta$$

$$= \frac{2}{4\pi\varepsilon_0} \int_{0}^{L} \frac{\lambda dx}{(x^2+z^2)} \cos\theta$$

$$\vec{E} = \frac{2\lambda z}{4\pi\varepsilon_0} \int_{0}^{L} \frac{dx}{(x^2+z^2)^{3/2}}$$

$$\vec{E} = \frac{2\lambda z}{4\pi\varepsilon_0} \left(\frac{x}{z^2\sqrt{x^2+z^2}} \right) \Bigg|_{0}^{L} =$$

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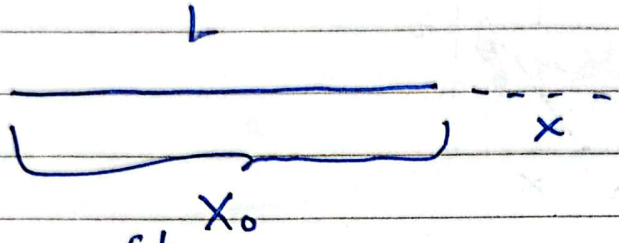


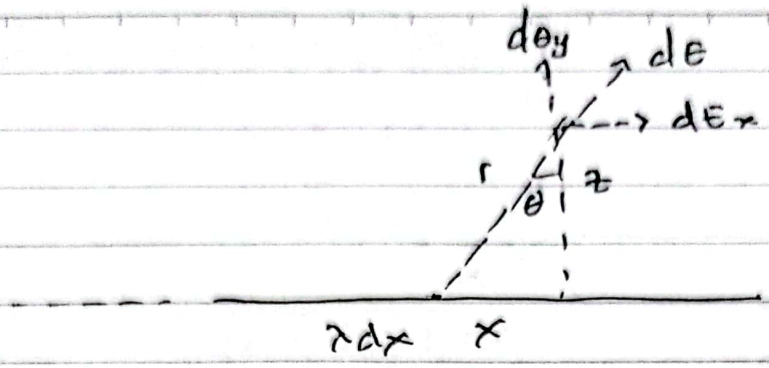
$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \int_0^L \frac{\lambda\, dx}{(x_0 - x)^2}$$

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \lambda \int_0^L (x_0 - x)^{-2}\, dx$$

$$= \frac{1}{4\pi\varepsilon_0} * \left((x_0 - x)^{-1}\right|_0^L$$

$$= \frac{1}{4\pi\varepsilon_0} \left(\frac{1}{(x_0 - x)}\right|_0^L$$

$$= \frac{1}{4\pi\varepsilon_0} \left(\frac{1}{(x_0 - L)} - \frac{1}{(x_0 - 0)}\right) = \frac{1}{4\pi\varepsilon_0} \left[\frac{x_0 - (x_0 - L)}{x_0 (x_0 - L)}\right] = \frac{L}{x_0 (x_0 - L)}$$



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

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \int_{-\infty}^{\infty} \frac{\lambda dx}{r^2} \cos\theta$$

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

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

$$dx = \frac{z}{\cos^2\theta} \rightarrow x = -\infty$$

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

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