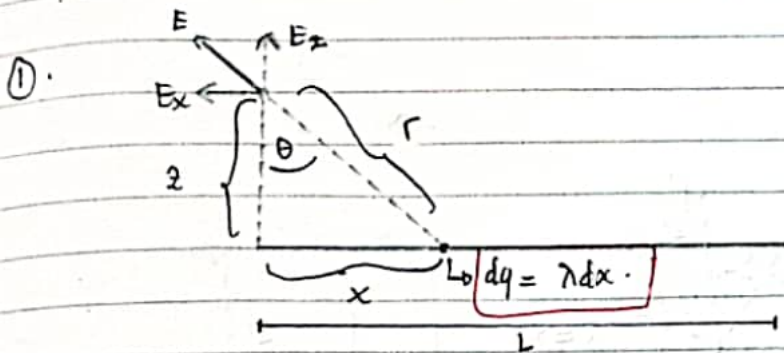


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$$\vec{E} = \vec{E}_z + \vec{E}_x$$

$$\Rightarrow \vec{E}_z = \frac{1}{4\pi\epsilon_0} \int_0^L dE \cos \theta$$

$$\vec{E}_z = \frac{1}{4\pi\epsilon_0} \int_0^L \frac{dq}{r^2} = \frac{1}{4\pi\epsilon_0} \int_0^L \frac{\lambda dx}{r^2} \cos \theta \quad ; \cos \theta = \frac{z}{r}$$

$$\vec{E}_z = \frac{1}{4\pi\epsilon_0} \int_0^L \frac{\lambda dx}{r^2} = \frac{1}{4\pi\epsilon_0} \int_0^L \frac{\lambda dx}{(z^2 + x^2)^{3/2}}$$

$$\vec{E}_z = \frac{1}{4\pi\epsilon_0} \lambda z \left[\frac{1}{z^2 \sqrt{z^2 + x^2}} \right]_0^L$$

$$\vec{E}_z = \frac{\lambda z}{4\pi\epsilon_0} \frac{L}{z^2 \sqrt{z^2 + x^2}}$$

$$\vec{E}_z = \frac{\lambda}{4\pi\epsilon_0} \frac{L}{z \sqrt{z^2 + x^2}}$$

$$\Rightarrow \vec{E}_x = - \frac{1}{4\pi\epsilon_0} \int_0^L \frac{\lambda dx}{r^2} \sin \theta$$

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

$$= - \frac{\lambda}{4\pi\epsilon_0} \cdot \frac{1}{2} \int_0^L \frac{d\alpha^2}{(z^2 + x^2)^{3/2}}$$

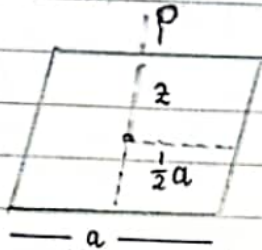
$$= - \frac{\lambda}{4\pi\epsilon_0} \cdot \frac{1}{2} \left[-2 \frac{1}{(z^2 + x^2)^{1/2}} \right]_0^L$$

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

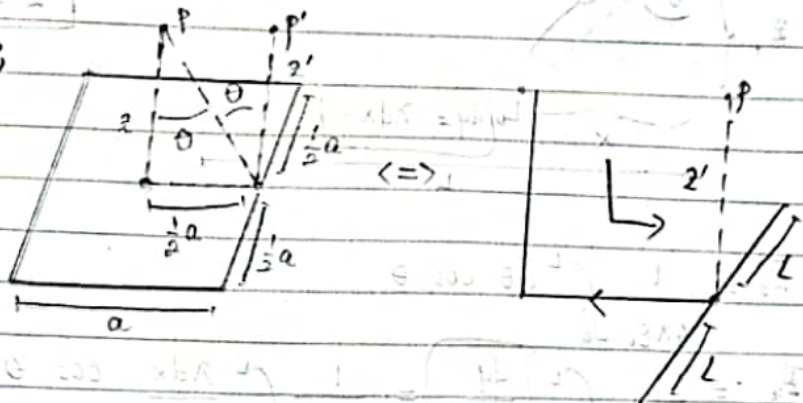
$$= - \frac{\lambda}{4\pi\epsilon_0} \left[\frac{1}{z} - \frac{1}{\sqrt{z^2 + x^2}} \right]$$

Jadi, $\vec{E} = \vec{E}_z + \vec{E}_x$.

2.



$$\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{2\lambda L}{z^2};$$



$P = P' \cos \theta$; Karena ada 4 sisi, maka

$P = 4P' \cos \theta$; sehingga.

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{2\lambda L}{z^2}$$

$$= 4 \cdot \frac{1}{4\pi\epsilon_0} \frac{2\lambda L \cos \theta}{z^2}$$

karena $L = \frac{1}{2}a$ dan $z' = r = \sqrt{z^2 + (\frac{1}{2}a)^2}$ dan $\cos \theta = \frac{z}{\sqrt{z^2 + (\frac{1}{2}a)^2}}$, maka

$$\vec{E} = 4 \cdot \frac{1}{4\pi\epsilon_0} \cdot \frac{2\lambda(\frac{1}{2}a) \cdot z}{(z^2 + (\frac{1}{2}a)^2) \sqrt{z^2 + (\frac{1}{2}a)^2}}$$

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{4\lambda a z}{(z^2 + \frac{a^2}{4}) \sqrt{z^2 + \frac{a^2}{4}}}$$