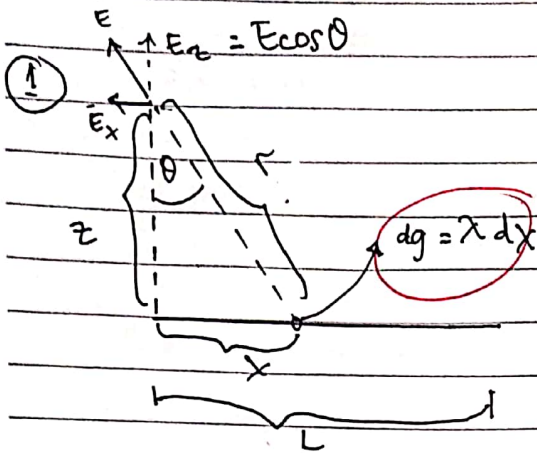




$$\vec{E} = \vec{E}_z + \vec{E}_x$$

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

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

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

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

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

$$\text{lihat di atas integral } \int_0^L \frac{dx}{(z^2 + x^2)^{3/2}} = \frac{1}{z^2} \left[ \frac{x}{\sqrt{z^2 + x^2}} \right]_0^L$$

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

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

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

arah  $\vec{E}$  ke kiri

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

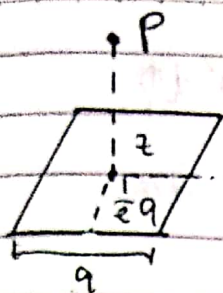
$$= - \frac{\lambda}{4\pi\epsilon_0} \cdot \frac{1}{2} \left[ -2 \frac{1}{(z^2 + x^2)^{1/2}} \right]_0^L$$

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

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

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

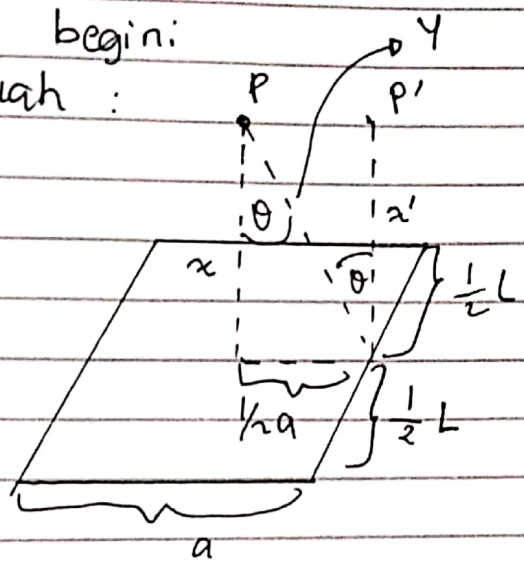
2



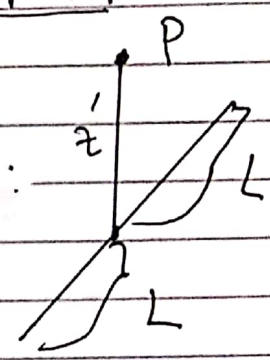
Solusi : Untuk menyelesaikan soal diatas gunakan contoh no. 3 yaitu kawat yang panjangnya  $2L$  , dengan  $\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{2\lambda L}{z^2}$

$\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{2\lambda \cdot L}{z^2}$  Hasil contoh no. 3

Konsepnya begini:  
masalah :



contoh no 3



$P = P' \cos \theta$  . karena ada 4 sisi maka  
 $P = 4 P' \cos \theta$  , sehingga

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

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