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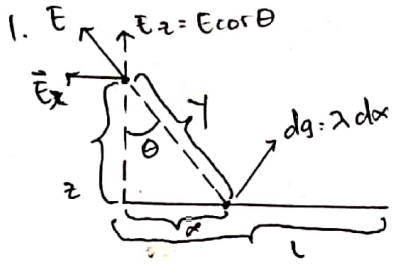
1. 

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

$$\vec{E}_z = \frac{1}{4\pi\varepsilon_0}\int_0^l d\vec{E}\cos\theta$$

$$\vec{E}_z = \frac{1}{4\pi\varepsilon_0}\int_0^l \frac{dq}{\gamma^2} = \frac{1}{\square}\int_0^l \frac{\lambda\,dx}{\square}\cos\theta$$

$$\Rightarrow \cos\theta = \frac{z}{\gamma}$$

$$\vec{E}_z = \frac{1}{\square}\int_0^l \frac{z\lambda\,dx}{\square} = \frac{1}{\square}\int_0^l \frac{z\lambda\,dx}{(z^2+x^2)^{3/2}}$$

$$= \frac{z\lambda}{4\pi\varepsilon_0}\int_0^l \frac{dx}{(z^2+x^2)^{3/2}}$$

Lihat didaftar Integral $\int_0^l \frac{dx}{(z^2+x^2)^{3/2}} = \frac{1}{z^2}\cdot\frac{x}{\sqrt{z^2+x^2}}\Big|_0^L$

$$= \frac{1}{4\pi\varepsilon_0}\lambda z\left[\frac{1}{z^2}\frac{x}{\sqrt{z^2+x^2}}\right]_0^L$$

$$\vec{E}_z = \frac{\lambda z}{4\pi\varepsilon_0}\frac{L}{z^2\sqrt{z^2+x^2}} = \frac{\lambda}{4\pi\varepsilon_0}\frac{L}{z\sqrt{z^2+x^2}}$$

$$\vec{E}_x = -\frac{1}{4\pi\varepsilon_0}\int_0^L \frac{\lambda\,dx}{\rho^2}\sin\theta = -\frac{\lambda}{4\pi\varepsilon_0}\int_0^L \frac{x\,dx}{z^2+t^2)^{3/2}}$$

arah $\vec{E}_x$ kekiri

$$= -\frac{\lambda}{4\pi\varepsilon_0}\cdot\frac{1}{2}\int_0^l \frac{dx^2}{(z^2+x^2)^{3/2}}$$

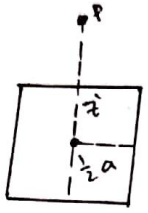
$$= -\frac{\lambda}{4\pi\varepsilon_0}\frac{1}{2}\left[-2\frac{1}{(z^2+x^2)^{1/2}}\right]_0^L$$

$$= -\frac{\lambda}{4\pi\varepsilon_0}\left[-\left(\frac{1}{(z^2+x^2)^{1/2}} - \frac{1}{z}\right)\right]$$

$$\vec{E}_x = -\frac{\lambda}{4\pi\varepsilon_0}\left[\frac{1}{z} - \frac{1}{\sqrt{z^2+x^2}}\right]$$

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

2.

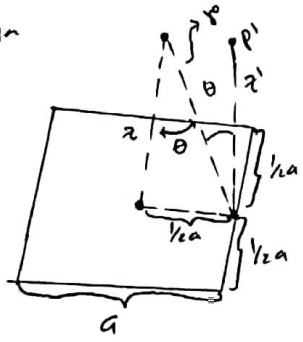


Solusi : untuk menyelesaikan bunalcan contoh no 3

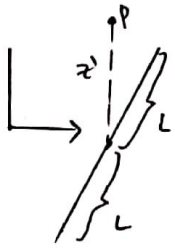
Yaitu kawat yang panjangnya 2L, dg $\vec{E} = \frac{1}{4\pi\varepsilon_0} \frac{2\lambda L}{z'^2}$

$\vec{E} = \frac{1}{4\pi\varepsilon_0} \frac{2\lambda L}{z'^2}$ hasil contoh no 3

konsepnya



contoh 3



P = P' cos θ ; karna ada 4 sisi, maka

P = 4P' cos θ ; sbg

$\vec{E} = \frac{1}{4\pi\varepsilon_0} \frac{2\lambda L}{z'^2} = 4 \frac{1}{4\pi\varepsilon_0} \frac{2\lambda L}{z'^2} \cos\theta$

karna, $L = \frac{1}{2}a$, 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

$\vec{E} = 4 \frac{1}{4\pi\varepsilon_0} \cdot \frac{2\lambda(\frac{1}{2}a) \cdot z}{z^2 + (1/2\,a)^2 \sqrt{z^2 + 1/2\,a)^2}}$

$\therefore \frac{1}{4\pi\varepsilon_0} \frac{4\lambda a z}{(z^2 + \frac{a^2}{a}) \sqrt{z^2 + \frac{a^2}{4}}} \cdot \hat{z}$