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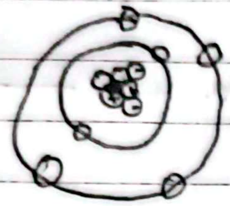
No Jum'at
Date 12 - 09 - 2025

Medan Elektromagnetik

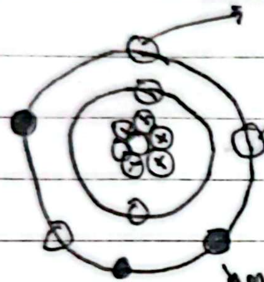
Medan oleh muatan yg terdistribusi.

q^0



proton 1 elektron 1 = stabil

$q^0 = \pm ne^-$
$= 2e^-$



lepas = maka akan bermuatan positif $q = +2e^+$

3 muatan = $3e^-$

=> Netral / tdk bermuatan

bermuatan.

$q = +2e^+$

$$\boxed{\vec{E} = \frac{1}{4\pi\varepsilon_0} = \frac{2q}{r^2}\hat{r}_0}$$

Muatan terperangkap di Sistem Koordinat.

Note:
Muatan adlh kata sifat dari atom.

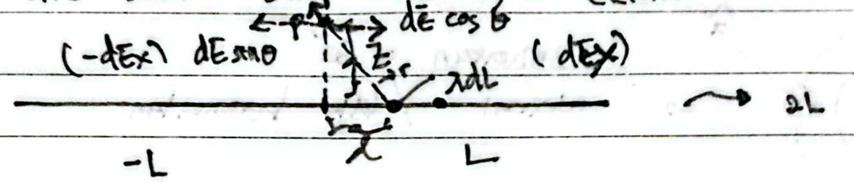
Medan Terdistribusi dalam bahan.

① . $\vec{E} = \frac{q}{4\pi\varepsilon_0 r^2}\hat{r}_0 \rightarrow$ Teetutiik

$\vec{E} = \frac{1}{4\pi\varepsilon_0}\int \frac{q}{r^2}\,dL \rightarrow$ Muatan berbentuk garis ——

contoh :

Tersusun atas atom" dan kekurangan elektron



brapa bsar ?

$d\vec{E} = dE_y + \underset{\rightarrow 0}{dE_x}$

$= dE_y$

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

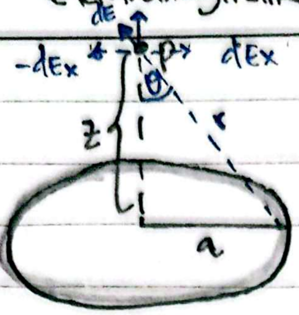
$\vec{E} = \frac{1}{4\pi\varepsilon_0}\int_{-L}^{L}\frac{dq}{r}\cos\theta.$

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

$= \frac{1}{4\pi\varepsilon_0}\int_0^{2L}\frac{\lambda dl}{r^2}\cos\theta = \frac{1}{4\pi\varepsilon_0}\int_0^{2L}\frac{x\,dl\cos\theta}{r^2}$

$= \frac{1}{4\pi\varepsilon_0}\int_0^{2L}\frac{\lambda z}{r^3}\,dl.$

Medan Elektromagnetik



$=0$ saling meniadakan.

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

eksekusi :

$$\vec{E} = d\vec{E}\cos\theta \Rightarrow \text{lingkaran}$$

$$\vec{E} = \frac{1}{4\pi\varepsilon_0}\int_0^{2\pi a}\frac{\lambda\, dl \cos\theta}{\cancel{\cos}\; r^2}$$

$$= \frac{1}{4\pi\varepsilon_0}\int_0^{2\pi a}\frac{\lambda z}{r^3}\, dl$$

$$= \frac{1}{4\pi\varepsilon_0}\int_0^{2\pi a}\frac{\lambda z}{(z^2+a^2)^{3/2}}\, dl$$ tidak ada hubungan

$$= \frac{\lambda z}{4\pi\varepsilon_0 (z^2+a^2)^{3/2}}\, l \Big|_0^{2\pi a}$$

$$\vec{E} = \frac{\lambda z \;\cancel{2}\pi a}{\cancel{4}\pi\varepsilon_0 \;(z^2+a^2)^{3/2}}$$

$$= \frac{\lambda z a}{2\varepsilon_0 (z^2+a^2)^{3/2}}$$ (dalam satu cincin)

Medan ElektroMagnetik.

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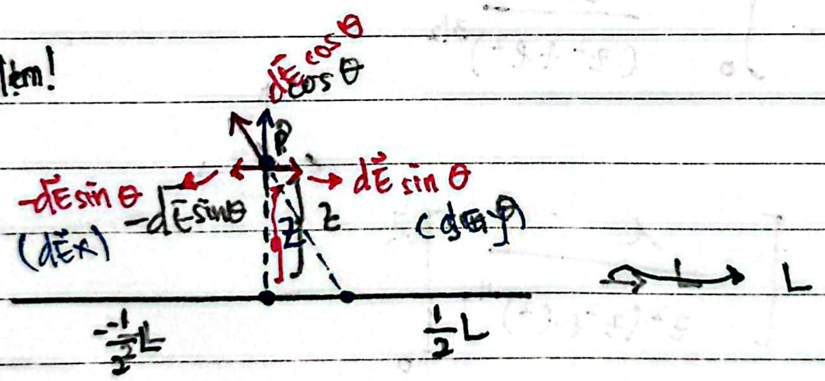
$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \int_0^{2L} \frac{\lambda z \, dl}{(z^2+l^2)^{3/2}}$$ note: $r = (z^2+l^2)^{1/2}$

$$= \frac{z\lambda}{4\pi\varepsilon_0} \int \frac{dl}{(z^2+l^2)^{3/2}}.$$

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

$$\vec{E} = \frac{z\lambda}{4\pi\varepsilon_0} \left[\frac{2L}{z^2(z^2+2L)^2} \right]$$

Problem!



$$d\vec{E} = dE_y + \cancelto{0}{dE_x}$$
$$= d\vec{E}_y$$
$$d\vec{E} = dE \cos\theta$$

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

note : $r = (z^2 + \ell^2)^{1/2}$ No

Date

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

$$= \frac{1}{4\pi\varepsilon_0} \int_0^L \frac{\lambda\, d\ell}{r^2} \cos\theta = \frac{1}{4\pi\varepsilon_0} \int_0^L \frac{\lambda\, d\ell}{r^2} \cos\theta$$

$$= \frac{1}{4\pi\varepsilon_0} \int_0^L \frac{dz}{r^3}\, d\ell$$

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \int_0^L \frac{\lambda z\, d\ell}{(z^2+\ell^2)^{3/2}}$$

$$= \frac{z\lambda}{4\pi\varepsilon_0} \int_0^L \frac{d\ell}{(z^2+\ell^2)^{3/2}}$$

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

$$\vec{E} = \frac{z\lambda}{4\pi\varepsilon_0} \left[\frac{L}{z^2(z^2+(L)^2)} \right]$$

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

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