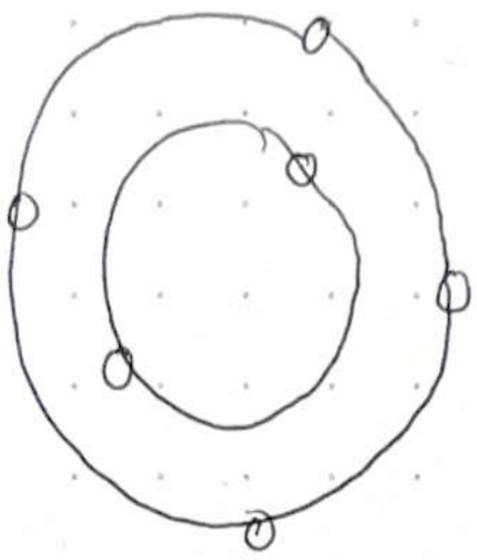
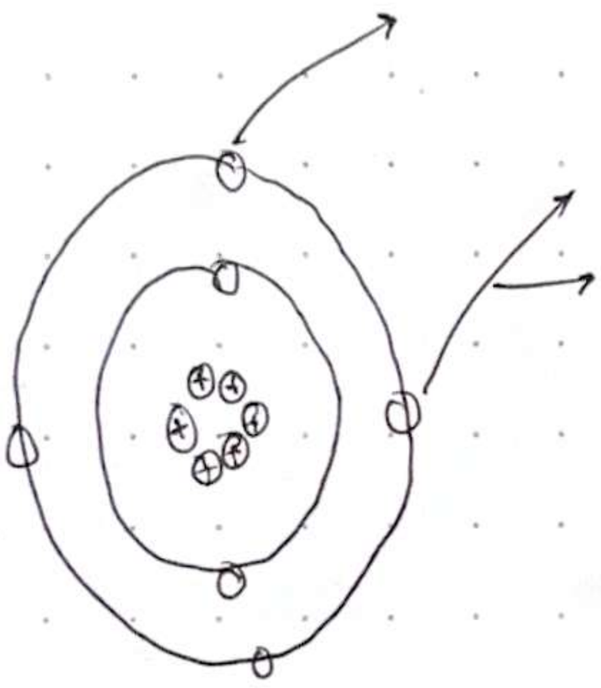
Medan pada Muatan yang Terdistribusi

$\vec{E}$ oleh muatan distrit



$$q = \pm n\bar{e}$$
$$= \pm e$$



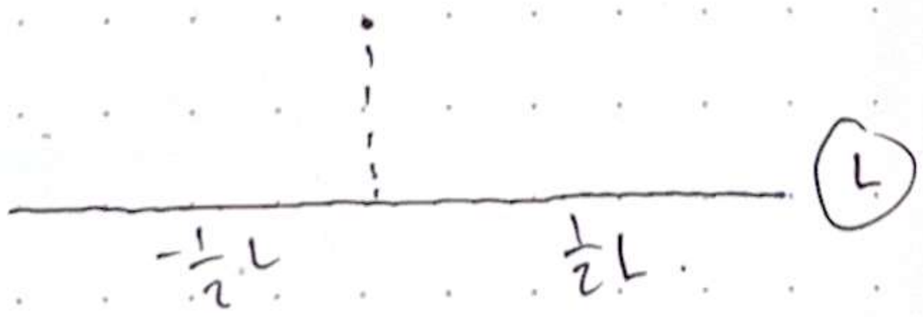
Muatan bisa terperangkat di sistem koordinat

$q = 3\vec{e}$

medan terdistribusi dalam bahan.

(1) $\vec{E} = \frac{1}{4\pi\varepsilon_0 r^2}\hat{r}_0$ → distrit.

contoh :



$$= dE_y + dE_x.$$
$$= dE_y.$$
$$dE = dE\cos\theta.$$
$$E = \frac{1}{4\pi\varepsilon_0}\int \frac{dq}{r^2}\cos\theta$$
$$= \frac{1}{4\pi\varepsilon_0}\int_{-\frac{1}{2}}^{\frac{1}{2}} \frac{\lambda\, dx}{r^2}\cos\theta.$$

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

$$d\vec{E} = dE_y + \overrightarrow{dE_x}^{0}$$
$$= dE_y$$

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

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

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

$$= \frac{1}{4\pi\varepsilon_0}\int_{0}^{2L}\frac{\lambda\, dl}{r^2}\cos\theta - \frac{1}{4\pi\varepsilon_0}\int_{0}^{2L}\frac{\lambda\, dl}{r^2}\cos\theta$$

$$= \frac{1}{4\pi\varepsilon_0}\int_{0}^{2L}\frac{\lambda z}{r^3}\, dl.$$

$$= \frac{1}{4\pi\varepsilon_0}\int_{0}^{2L}\frac{\lambda z\, dl}{(z^2+l^2)^{3/2}}$$

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