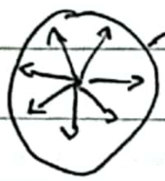
Kalisma

Date 25 - maret - 2024

~ Hukum Gauss ~

E : yg muncul pada q
yg luasa
D

$$\oint_S \vec{E}\cdot d\vec{a} = \int_V (\nabla\cdot\vec{E})\, d\tau$$



Hukum Gauss.

$$\oint \vec{E}\cdot da = \oint \frac{q}{4\pi\epsilon_0 r^2}\, r^2 \sin\theta\, d\theta\, d\phi$$

$$= \frac{q}{4\pi\epsilon_0}\int_0^{\pi}\int_0^{2\pi} \sin\theta\, d\theta\, d\phi$$

$$= \frac{4\pi q}{4\pi\epsilon_0}$$

Hk. 1

$$\boxed{\oint \vec{E}\cdot da = \frac{q}{\epsilon_0}}$$

Persamaan Gauss dalam bentuk dipereno

$$\int_V (\nabla\cdot\vec{E})\, d\tau$$

$Q = \int \rho\, d\tau$ $\qquad \oint_S \vec{E}\cdot d\vec{a} = \int (\nabla\cdot\epsilon).\pi\epsilon_0$

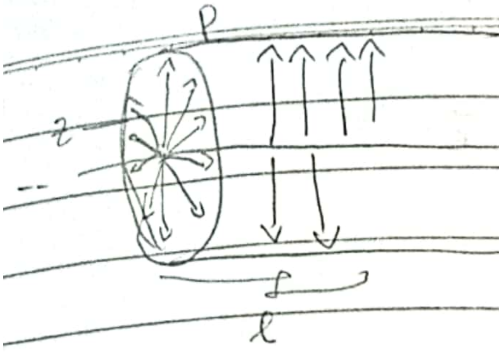
$$\int_V (\nabla\cdot\vec{E})\, d\tau = \frac{Q}{\epsilon_0} \to \int \rho\, d\tau$$

$$\frac{1}{\epsilon_0}\int \rho\, d\tau$$

$$\boxed{\nabla\cdot\vec{E} = \frac{\rho}{\epsilon_0}}$$

Hk. 2 Gauss dalam bentuk deferensial.

Date

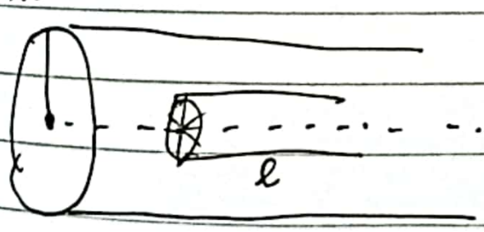


$$\oint \vec{E} \cdot da = \frac{q}{\varepsilon_0}$$

$$\vec{E}(2\pi z \cdot \ell) = \frac{\lambda \cdot \ell}{\varepsilon_0}$$

$$\vec{E} = \frac{\lambda}{2\pi\varepsilon_0 z}\,\hat{z}_0$$

Sebuah silinder pejal panjang sekali, dan jari² silinder R, rapat muatannya q, hitung medan listrik didalam silinder



$$\oint \vec{E}\, da = \frac{Q}{\varepsilon_0}$$

$$\vec{E}(2\pi r \cdot \ell) = \frac{Q}{\varepsilon_0}$$

$$\vec{E} = \frac{Q}{2\pi\varepsilon_0 r l}\,\hat{r}_a$$

OKEY

Date

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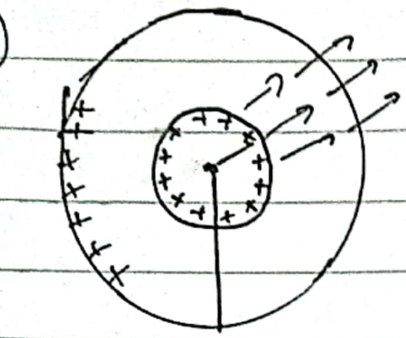


calculatif Qf $\vec{E}$

1) $\rho < a$

2) $a < r < b$

3) $\rho > b$

1). $\vec{E} = 0$

2). $\oint \vec{E} \cdot da = \dfrac{Q}{\varepsilon_0}$

$\oint \vec{E} \cdot da$

$\vec{E}(4\pi r^2) = \dfrac{1}{\varepsilon_0} \iiint \rho \, d\tau$

$\int_0^{\pi} \int_0^{2\pi} \sin\theta \, d\theta \, d\phi = 4\pi$

$= \dfrac{1}{\varepsilon_0} \int_0^{a} \int_0^{2\pi} \int_0^{\pi} \rho \, r^2 \sin\theta \, d\phi \, d\rho$

$= \dfrac{4\pi\rho}{\varepsilon_0} \int_0^{a} \rho \, d\rho$

$\int_0^{\pi} \int_0^{2\pi} \sin\theta \, d\theta \, d\phi = 4\pi$

$E(4\pi r^2) = \dfrac{4\pi}{\varepsilon_0} \int_0^{a} r^2 \, dr$

$= \dfrac{4\pi}{\varepsilon_0} \left(\dfrac{1}{3} r^3 \right)_0^{a}$

$\dfrac{4}{3} \dfrac{\pi a^3}{\varepsilon_0 a^3} = \dfrac{\rho r^3}{3\varepsilon_0 r^2} \hat{r}$

OAKLEY

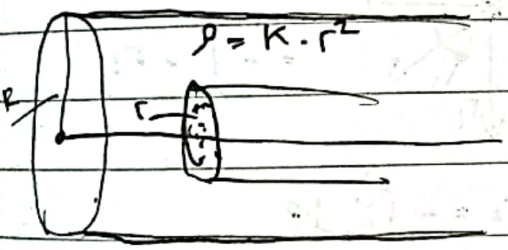
3) $p > b$

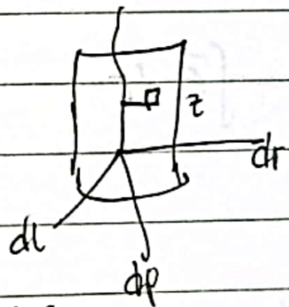
$$\oint \vec{E} \cdot da = \frac{1}{\varepsilon_0} \iiint \rho \, d\tau$$

$$= \frac{1}{\varepsilon_0} \iiint \rho r^2 \sin\theta \, d\theta \, d\phi \, d\cdot$$

$$= \frac{4\pi\rho}{\varepsilon_0} \int_a^b p^2 \, dp$$

$$= \frac{4\pi\rho}{\varepsilon_0} \left(\frac{1}{3} r^3 \Big|_a^b \right)$$





1). $p < R$

2) $p > R$

1) $\oint \tilde{E} \, da = \frac{1}{\varepsilon_0} \iiint \rho \, d\tau$

$$\vec{E} (2\pi p) = \frac{1}{\varepsilon_0} \int_0^{2\pi} \int^{\ell} \int^{R} (k p^2) \, r^2 \sin\theta \, d\phi \, dz \, dr$$

$$= \frac{2\pi k}{\varepsilon_0} \int_0^{\ell} dz \cdot \int_0^R r^2 \, dr$$

2). $\oint \vec{E} \, da = \frac{Q}{\varepsilon_0}$

$$\vec{\varepsilon_0} (2\pi r \cdot l) = \frac{1}{\varepsilon_0} \int_0^R \int_0^{\pi}$$

Potensial → oleh muatan listrik

Beda potensial → oleh medan listrik.

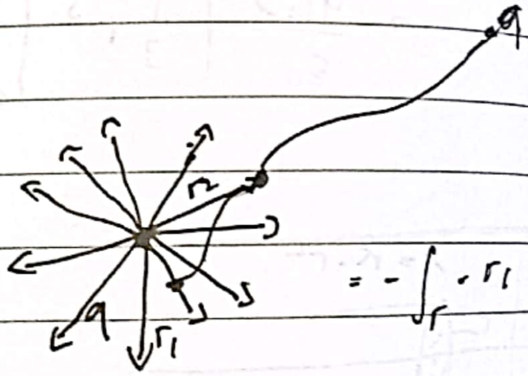
= usaha ~~...~~ yg dilakukan pemindahan pada titik terten

secara kasus mtk

$W = F \cdot s$

$V = \frac{W}{q} = \frac{F \cdot S}{q} = \frac{k \frac{q \cdot q}{r} r}{q}$

$\boxed{V = k \frac{q}{p}}$



$= -\int_{r} \cdot r_1$

secara fisika

$V = -\int \vec{E}\, dr$

$V_1 - V_2 = -\int_{r_2}^{r_1} \vec{E}\, d\vec{\varphi}$

$\Delta V \neq dV$

$= -\square \int_{r_1}^{r_2} r^{-2}\, dr$

$= -\square \left(-\frac{1}{r} \Big|_{r_1}^{r_2} \right) = \square \left(\frac{1}{r_2} - \frac{1}{r_1} \right)$

$\Delta V = -\int_{r_1}^{r_2} \frac{a r'}{4\pi\varepsilon_0 r^2}\, dp$

$= \frac{r_1 q}{4\pi\varepsilon} \int_{r_1}^{r_2} r^{-2}\, dr$

$\to V = \frac{1}{4\pi\varepsilon_0} \frac{q}{p} \to k \frac{q}{r}$