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Hukum Gauss and Applied

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

$$\oint \vec{E} \cdot d\vec{a} = \oint \frac{q}{4\pi\varepsilon_0 r^2}\, r^2 \sin\theta\, d\theta\, d\phi$$

$$= \frac{q}{4\pi\varepsilon_0} \int_0^{\pi}\int_0^{2\pi} \sin\theta\, d\theta\, d\phi$$

$$= \frac{4\pi\, q}{4\pi\, \varepsilon_0}$$

$$\oint_S \vec{E}\, da = \frac{q}{\varepsilon_0} \longrightarrow$$ Persamaan gauss dalam bentuk diferensial.

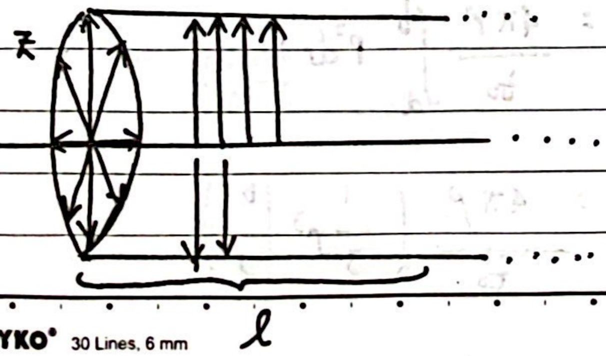
$$\int_V (\nabla \cdot \vec{E})\, d\tau$$

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

$$\int_V (\nabla \cdot \vec{E})\, d\tau = \frac{Q}{\varepsilon_0} \longrightarrow \int \rho\, d\tau$$

$$\frac{1}{\varepsilon_0} \int \rho\, d\tau$$

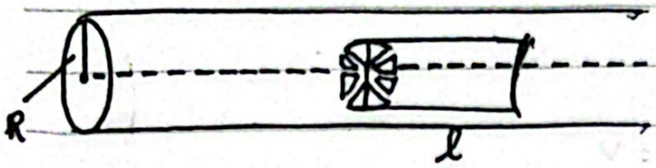
$$\nabla \vec{E} = \frac{\rho}{\varepsilon_0}\, l \longrightarrow$$ Hukum gauss dalam bentuk diferensial.



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

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

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

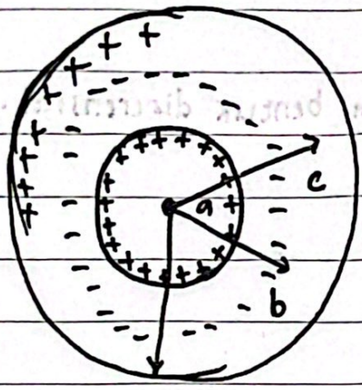


$$\oint \vec{E}\, da = \frac{Q}{\epsilon_0}$$

$$\vec{E}\,(2\pi r \cdot l) = \frac{Q}{\epsilon_0}$$

$$\vec{E} = \frac{Q}{2\pi \epsilon_0 r l}\,\hat{r}_0$$

1)



a) $\vec{E} = 0$

b) $\oint \vec{E} \cdot da = \frac{Q}{\epsilon_0}$

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

$$\vec{E} \cdot (4\pi r^2) = \frac{1}{\epsilon_0} \iiint \rho\, d\tau$$

$$= \frac{1}{\epsilon_0} \int_0^a \int_0^{2\pi} \int_0^{\pi} r^2 \sin\theta\, d\phi\, dr$$

$$= \frac{4\pi\rho}{\epsilon_0} r^2 dr.$$

2) $\oint \vec{E} \cdot da = \frac{Q}{\epsilon_0}$

$$\vec{E}\,(2\pi \cdot \rho \cdot l) = \frac{1}{\epsilon_0} \int_0^R \int_0^{\pi}$$

$r > b$

$$\oint \vec{E} \cdot da = \frac{1}{\epsilon_0} \iiint \rho\, d\tau$$

$$= \frac{1}{\epsilon_0} \iiint \rho\, r^2 \sin\theta\, d\theta\, d\phi\, dr$$

$$= \frac{4\pi\rho}{\epsilon_0} \int_a^b \rho^2 dr$$

$$= \frac{4\pi\rho}{\epsilon_0} \left(\frac{1}{3} r^3 \Big|_a^b \right)$$