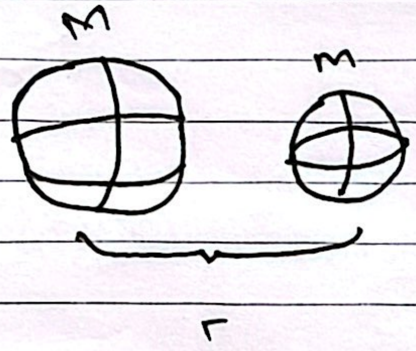
Kelistrikan dan Kemagnetan

No. :

Date. : 01.4.2024

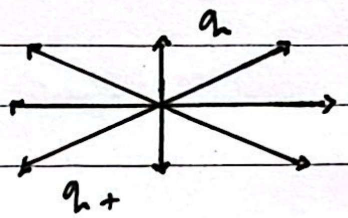
Potensial Listrik



$$W = \frac{k\, M \cdot m}{r}$$

$$V = \frac{W}{m} = k \frac{M}{r}$$

$$V_{ab} = \frac{W}{Q} = k \frac{q \cdot Q}{r}$$



$$W = \vec{F} \cdot \vec{r}$$

$$= k \frac{q \cdot Q}{r^2} \, r$$

$$= k \frac{q \cdot Q}{r}$$

Energi Potensial dari a – b

$$\int_a^b dV = -\int_{r_a}^{r_b} \vec{E}\, dr$$

$$V\Big|_a^b = -\int_{r_a}^{r_b} k \frac{q}{r^2}\, dr$$

$$= -kq \int_{r_a}^{r_b} r^{-2}\, dr$$

$$= -kq \left(-r^{-1} \Big|_{r_a}^{r_b} \right)$$

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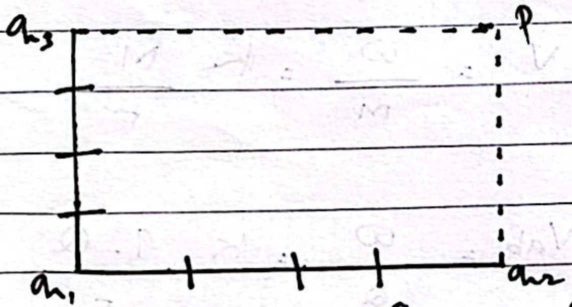
$$= kq\left[\frac{1}{r_b} - \frac{1}{r_a}\right]$$

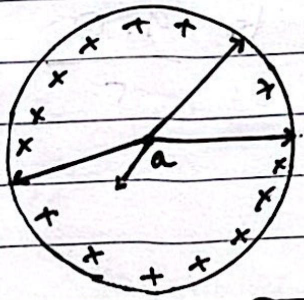
$$V_b - V_a = kq\left[\frac{1}{r_b} - \frac{1}{r_a}\right]$$



$$V_p = k\left[\frac{q_1}{\sqrt{32}} + \frac{q_2}{4} + \frac{q_3}{4}\right]$$

$$r = \sqrt{4^2 + 4^2}$$

Tidak ada muatan



$$V_b - V_a = kq\underbrace{\left[\frac{1}{r_b} - \frac{1}{r_a}\right]}_{=0}$$

$$V_b = V_a = k\frac{Q}{R}$$

$$V_a = k\frac{Q}{R} \qquad V = k\frac{Q}{r}$$

$r > R$

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Persamaan Poison dan Lapalace

$\nabla \cdot \nabla V = \nabla^2 V$

$\vec{E} = -\nabla V$

$V = -\int \vec{E} \cdot d\vec{r} = -\int_{-\infty}^{\infty} \frac{\lambda}{2\pi \varepsilon_0 r} dr = -\frac{\lambda}{2\pi\varepsilon_0}\int_{-\infty}^{\infty} \frac{1}{r} dr$

$= -\int \vec{E} \cdot d\vec{l}$

$z \mid y$

$\vec{E} = \frac{\lambda}{2\pi\varepsilon_0}$ $\oint \vec{E}\, da = \frac{Q}{\varepsilon_0}$

$E\,(2\pi r p)$

$V = k\frac{q}{r}$ → diskrit (terpisah - pisah)

$V = k\int \frac{\sigma\, da}{r}$

$= k\int \frac{dq}{r} \longrightarrow \sigma a$

→ tidak diskrit (terdistribusi)

KIKY

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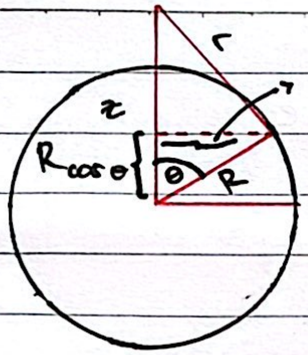

$$r = \sqrt{(R\sin\theta)^2 + (z - R\cos\theta)^2}$$

$$= \sqrt{R^2 + z^2 - 2Rz\cos\theta}$$

$$V = \frac{1}{4\pi\varepsilon_0} \int_0^{2\pi}\int_0^{\pi} \frac{\sigma\, da}{r}$$

$$= \frac{1\sigma}{4\pi\varepsilon_0} \iint \frac{r^2 \sin\theta\, d\theta\, d\phi}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}}$$

$$= \frac{2\pi\sigma}{4\pi\varepsilon_0} \int_0^{\pi} \frac{\sin\theta\, d\theta}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}}$$

$$= \frac{2\pi\sigma}{4\pi\varepsilon_0} \int \frac{d(\cos\theta)}{(R^2 + z^2 - 2Rz\cos\theta)^{\frac{1}{2}}}$$

$$= \int (R^2 + z^2 - 2Rz\cos\theta)^{-\frac{1}{2}}\, d(\cos\theta)$$