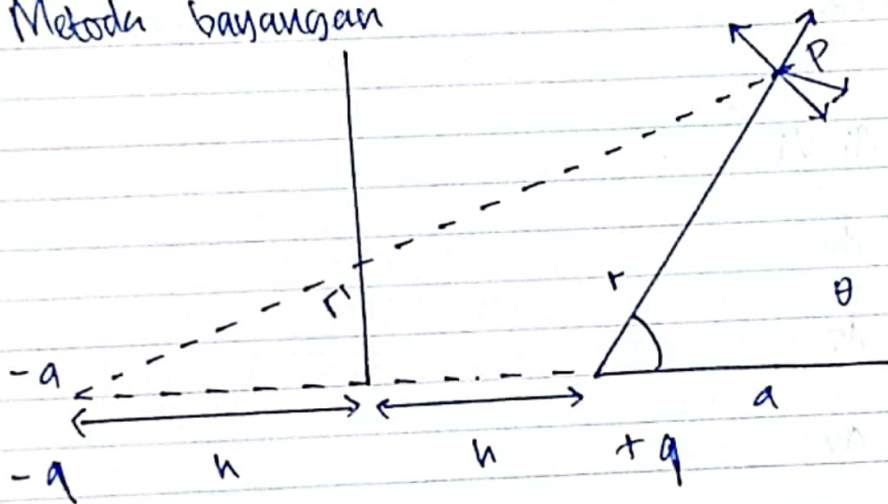


Bab 3 Metoda Penentuan Potensial

1. Metoda bayangan



Pada bidang AB
dimana $r' = r$, maka
potensial $V = 0$

Gambar batang konduktor dan muatan titik

$$P = \frac{1}{4\pi\epsilon_0} \frac{q}{r} + \frac{-q}{4\pi\epsilon_0 r'}$$

$$V = \frac{q}{4\pi\epsilon_0} \left[\frac{1}{r} + \frac{1}{r'} \right]$$

$$r' = (r^2 + 4h^2 + 4hr \cos \theta)^{1/2}$$

$$\frac{dV}{dP} = k \left[\frac{1}{r} - \frac{1}{(r^2 + 4h^2 + 4hr \cos \theta)^{1/2}} \right]$$

$$= k \left[\frac{1}{r^2} - \frac{1}{2} (\dots)^{-1/2} \cdot (2r + 4h \cos \theta) \right]$$

$$(r^2 + 4h^2 + 4hr \cos \theta)$$

Energi dan Muatan Distribusi kontinu Contoh Penerapan

$$W = \frac{1}{2} \int b V da$$

dimana

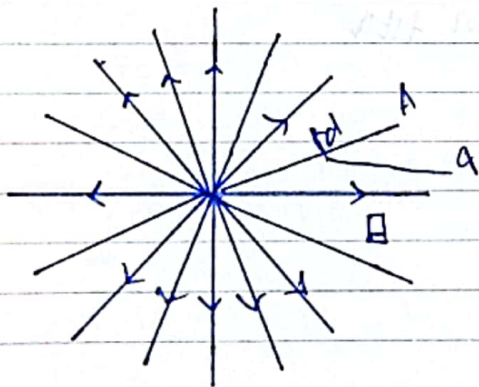
$$W = \frac{1}{2} \sum_{i=1}^n q_i V_i$$

$$W = \frac{1}{2} \int \rho V dP$$

$$W = \frac{1}{2} \int \sigma V ds$$

$$W = \frac{1}{2} \int P V dv$$

Usaha dan Energi



$$W = \int_A^B \vec{F} \cdot d\vec{l}$$

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

$$= -q \left[\frac{1}{4\pi\epsilon_0} \frac{q}{r^2} dr \right]$$

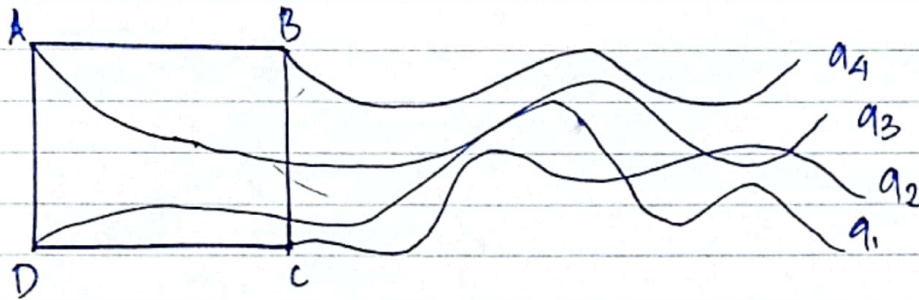
$$W = -q \left[-\frac{q}{4\pi\epsilon_0 r} \right]$$

$$= Q [V]$$

$$W = Q \cdot V$$

Usaha dan Energi

Contoh Soal



$$\begin{aligned} * W_1 &= q V_1 = 0 \\ W_2 &= q_2 V_2 = q_2 \left[k \frac{q_1}{r_1} \right] \end{aligned}$$

$$* W_2 = q_2 V_2$$

$$\begin{aligned} * W_2 &= q_3 V_3 \\ &= q_3 \left[k \frac{q_1}{r_1} + k \frac{q_2}{r_2} \right] \\ &= q_3 \end{aligned}$$

$$* W_4 = q_4 V_4 = q_4 \left[k \frac{q_1}{r_1} + k \frac{q_2}{\sqrt{2}r} + k \frac{q_3}{p} \right]$$

Contoh : Permisalan

$$\begin{aligned} W_F &= W_1 + W_2 + W_3 + \dots \\ &= k \cdot \frac{q_1 \cdot q_2}{p} + k \cdot \frac{q_1 \cdot q_3}{p} + k \cdot \frac{q_2 \cdot q_3}{p} + \dots \end{aligned}$$

$$W = \frac{1}{4\pi\epsilon_0} \sum_{i=1}^n \sum_{j=1}^n \frac{q_i \cdot q_j}{r_{ij}}$$