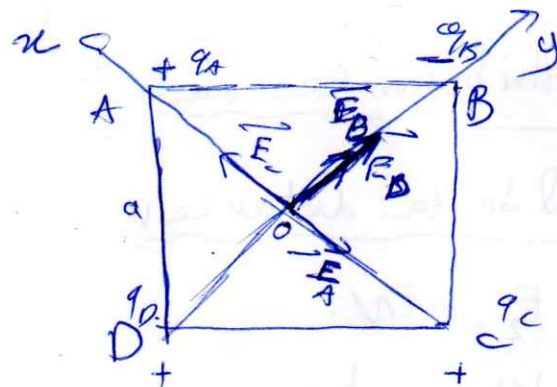


Exo 2 :

de champ $\vec{E}(0)$:



$$\vec{E}(0) = \vec{E}_A + \vec{E}_B + \vec{E}_C + \vec{E}_D$$

$$\vec{E}_A = -E_A \vec{i}, \quad \vec{E}_B = E_B \vec{j}$$

$$\vec{E}_C = E_C \vec{i}, \quad \vec{E}_D = E_D \vec{j}$$

$$\vec{E}(0) = (-E_A + E_C) \vec{i} + (E_B + E_D) \vec{j}$$

$$E_A = \frac{k|q_A|}{(OA)^2}, \quad E_B = \frac{k|q_B|}{(OB)^2}, \quad E_C = \frac{k|q_C|}{(OC)^2}, \quad E_D = \frac{k|q_D|}{(OD)^2}$$

$$r_{OA} = r_{OB} = r_{OC} = r_{OD} \quad | \quad q_A = q_C = 2 \times 10^{-8} \text{ C}$$

$$\Rightarrow E_A = E_C \Rightarrow \vec{E}(0) = (E_B + E_D) \vec{j}$$

$$r_{OA} = r_{OB} = r_{OC} = r_{OD} = \frac{\sqrt{a^2 + a^2}}{2} = \frac{\sqrt{2}a}{2} = \frac{a}{\sqrt{2}}$$

$$\Rightarrow \vec{E}(0) = \left(\frac{k|q_B|}{\frac{a^2}{2}} + \frac{k|q_D|}{\frac{a^2}{2}} \right) \vec{j} = \frac{2k}{a^2} (|q_B| + |q_D|) \vec{j}$$

$$= 540 \vec{j} \Rightarrow E(0) = 540 \text{ V/m}$$

2) Le potentiel $V(0)$ crée par ces 4 charges

au point 0 :

$$V(0) = V_A + V_B + V_C + V_D$$

$$= \frac{kq_A}{r} + \frac{kq_B}{r} + \frac{kq_C}{r} + \frac{kq_D}{r}$$

$$= \frac{k}{r} [q_A + q_B + q_C + q_D]$$

$$= \frac{2 \times 10^{-9}}{\frac{2}{\sqrt{2}}} [2 \times 10^{-8} - 8 \times 10^{-8} + 2 \times 10^{-8} + 4 \times 10^{-8}] = 0$$

$$V(0) = 0 \text{ V}$$