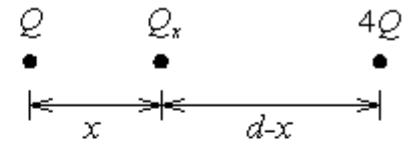


Določite oddaljenost x in množino naboja Q_x , ki zagotavljata, da bodo sile na vse tri točkaste naboje enake nič ($Q = 9 \mu\text{C}$, $d = 30 \text{ mm}$)!

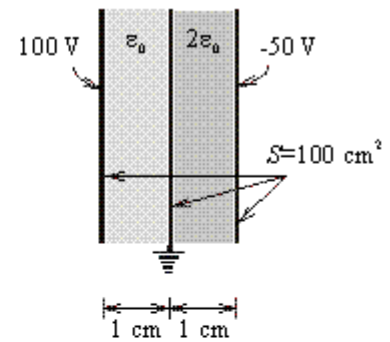


Rešitev:

$$\frac{Q}{x^2} = \frac{4Q}{(d-x)^2} \Rightarrow 2x = d - x \Rightarrow x = \frac{d}{3} = 10 \text{ mm}$$

$$\frac{Q}{d^2} = -\frac{Q_x}{(d-x)^2} \Rightarrow Q_x = -\left(\frac{d-x}{d}\right)^2 Q = -\left(\frac{2}{3}\right)^2 Q = -\frac{4}{9}Q = -4 \mu\text{C}$$

Določite množino naboja na srednji, ozemljeni plošči ($V = 0$), če krajnima dvema (ploščama) vsilimo potenciala 100 V in -50 V !



Rešitev:

$$E_{x1} = \frac{100\text{ V}}{10^{-2}\text{ m}} = 10^4\text{ V/m}$$

$$E_{x2} = \frac{50\text{ V}}{10^{-2}\text{ m}} = 5 \cdot 10^3\text{ V/m}$$

$$D_{x1} = \epsilon_0 10^4\text{ V/m}$$

$$D_{x2} = 2\epsilon_0 5 \cdot 10^3\text{ V/m}$$

$$\sigma_{st} = D_{x2} - D_{x1} = 0$$

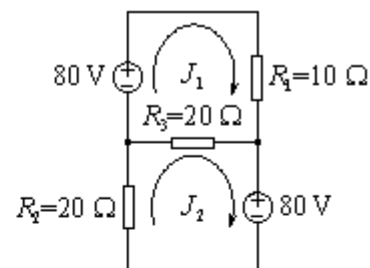
Koliko električne energije bo akumulirano na 10 km dolgi trasi nadzemnega vodnika polmera 2 cm, ki je obešen na višini 10 m od tal, ko ga priključimo na napetost 100 kV?

Rešitev:

$$C \cong \frac{2\pi\epsilon_0 l}{\ln \frac{2h}{a}} = \frac{2\pi \cdot 10^{-9} \cdot 10^4}{36\pi \ln \frac{20}{0.02}} \frac{\text{As}}{\text{Vm}} = 8.04 \cdot 10^{-8} \text{ F}$$

$$W_e = \frac{1}{2} CU^2 \cong 402 \text{ J}$$

Določite moči na upornikih!



Rešitev:

$$(30\ \Omega)J_1 - (20\ \Omega)J_2 = 80\ \text{V}$$

$$-(20\ \Omega)J_1 + (40\ \Omega)J_2 = -80\ \text{V}$$

$$(40\ \Omega)J_1 = 80\ \text{V} \Rightarrow J_1 = 2\ \text{A}$$

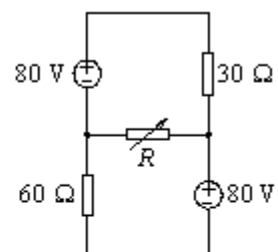
$$(80\ \Omega)J_2 = -80\ \text{V} \Rightarrow J_2 = -1\ \text{A}$$

$$P_1 = 40\ \text{W}$$

$$P_2 = 20\ \text{W}$$

$$P_3 = 180\ \text{W}$$

Določite največjo moč, ki jo more prejemati spremenljiv upornik R !



Rešitev:

$$U_T = 80 \text{ V}$$

$$R_T = 60 \Omega \parallel 30 \Omega = 20 \Omega \Rightarrow R = 20 \Omega$$

$$P_{\max} = \frac{(80 \text{ V})^2}{4 \cdot (20 \Omega)} = 80 \text{ W}$$