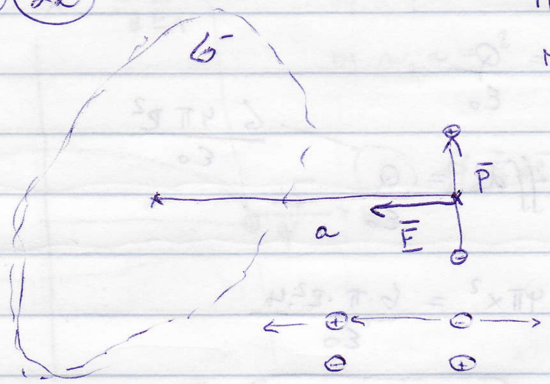
PR. 22

$\bar{M}_{max}(\alpha) \to \alpha = ?$

$M_{max} = ?$, $\beta = ? \to M(\beta) = 0$



$\bar{M} = \bar{p} \times \bar{E}$

$M = p \cdot E \cdot \sin\alpha$

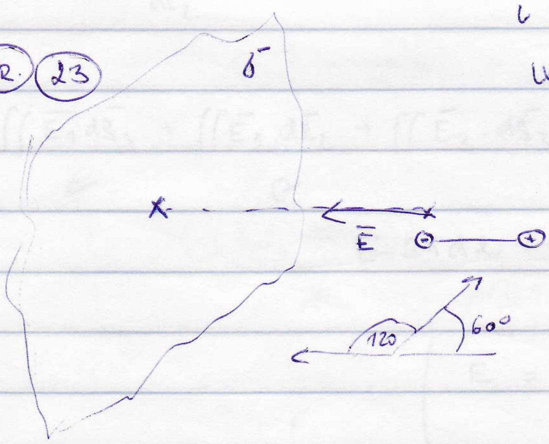
$M = p \cdot \dfrac{b}{2\varepsilon_0}$.

$\beta = 0, 180°$

PR. 23

$W_{p\,max}$, $\alpha = ?$

$\Delta\alpha = 60°$



$W_p = -\bar{p} \cdot \bar{E}$

$180° = -1$

$W_p = -p \cdot E \cdot \cos \quad -(-1)$ "

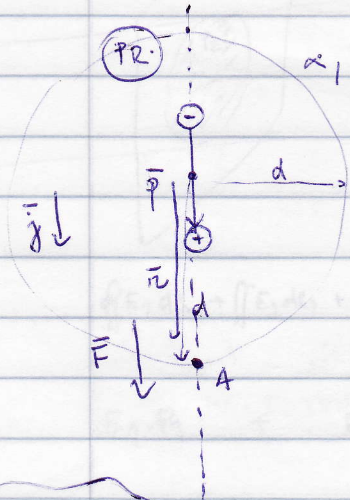
$\underline{W_p = p \cdot E}$

$\underline{\Delta\alpha}$: $W_p = -p \cdot E \cdot \cos 120° = p \cdot E \cdot \dfrac{1}{2}$

PR.

α, p, e

$F_{max} = ?$



$\bar{F} = \bar{E} \cdot e$

$$\bar{E} = \frac{1}{4\pi\varepsilon_0} \cdot \left(\frac{3(\bar{p}\cdot\bar{r})\cdot\bar{r}}{r^5} - \frac{\bar{p}}{r^3} \right)$$

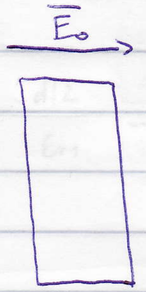
$\underline{r\ A:}$

$$\bar{E} = \frac{1}{4\pi\varepsilon_0} \cdot \left(\frac{3(\bar{p}\cdot r)\cdot r \cdot \bar{j}}{r^5} - \frac{p\cdot\bar{j}}{r^3} \right)$$

$$\bar{E} = \frac{1}{4\pi\varepsilon_0} \cdot \left(\frac{3 \cdot p \cdot \cancel{r} \cdot \cos\vartheta \cdot \cancel{r}}{r^{\cancel{5}\,3}} - \frac{p}{r^3} \right) \cdot \bar{j}$$

$$\boxed{\bar{F} = \frac{p \cdot e \cdot \bar{j}}{2\pi\varepsilon_0 \cdot d^3}} \Longleftarrow \bar{E} = \frac{1}{4\pi\varepsilon_0} \cdot \left(\frac{3p}{r^3} - \frac{p}{r^3} \right) \cdot \bar{j} = \frac{1}{4\pi\varepsilon_0} \cdot \frac{2p}{r^3} \cdot \bar{j} = \frac{p}{2\pi\varepsilon_0 r^2} \cdot \bar{j}$$

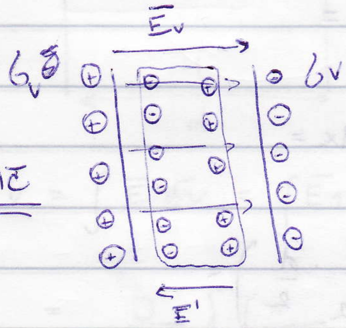
(PR.)



$\varepsilon_0, \varepsilon_r$.

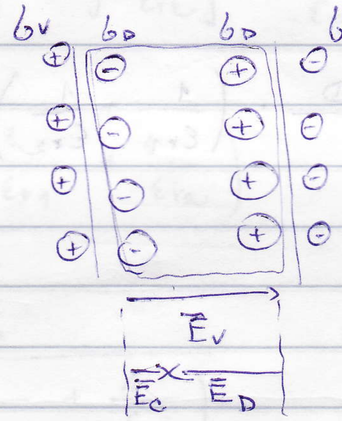
$D = ?,\ \bar{E}_c = ?,\ \bar{P} = ?$

VODIČ



$$E_v = \frac{\sigma_v}{\varepsilon_0}$$

DIELEKTRIKUM



$$\bar{E}_c = \bar{E}_v + \bar{E}_D$$

$$E_c = E_v - E_D$$

$$E_c = \frac{\sigma_v}{\varepsilon_0} - \frac{\sigma_D}{\varepsilon_0}$$

$$\underline{\varepsilon_0 E_c = \sigma_v - \sigma_D}$$

$$\boxed{\bar{D} = \varepsilon_0 \bar{E}_c + \bar{P}} \quad \longleftarrow \quad \varepsilon_0 E_c = D - P$$

vektor polarizácie

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pokračujeme príklad:

$$E_0 = \frac{\sigma_v}{\varepsilon_0} = \frac{D}{\varepsilon_0} \Rightarrow \underline{D = \varepsilon_0 \cdot E_0}$$

$$D = \varepsilon_0 \cdot E_c + \underbrace{\varepsilon_0 E_c \cdot \varkappa}_{P}$$

$$D = \varepsilon_0 E_c (\underbrace{1 + \varkappa}_{\varepsilon_r}) = \underline{\varepsilon_0 \varepsilon_r \cdot E_c = D} \Rightarrow \boxed{\frac{D}{\varepsilon_0 \varepsilon_r} = E_c}$$

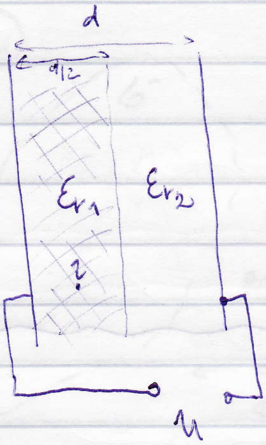
$$\varkappa = \varepsilon_r - 1$$

$$\underline{\frac{\varepsilon_0 \cdot E_0}{\varepsilon_0 \cdot \varepsilon_r} = E_c = \frac{E_0}{\varepsilon_r}}$$

$$\bar{P} = \varepsilon_0 E_c (\varepsilon_r - 1)$$

$$P = \varepsilon_0 \cdot \frac{E_0}{\varepsilon_r} \cdot (\varepsilon_r - 1)$$

27.



aká je intenzita E_e, D, P a ε_{r1}?
keď poznáme U.

$$U = \int \bar{E} \cdot d\bar{r} - |\bar{E} \parallel d\bar{r}| = \int E \cdot dr =$$

$$= \int_0^{\frac{d}{2}} E_{e1} \cdot dx + \int_{\frac{d}{2}}^{d} E_{e2} \cdot dx =$$

$$= \int \frac{D}{\varepsilon_{r1} \cdot \varepsilon_0} \cdot dx + \int \frac{D}{\varepsilon_{r2}\, \varepsilon_0} \cdot dx =$$

$$= \frac{D}{\varepsilon_0} \cdot \left(\frac{1}{\varepsilon_{r1}} \cdot \frac{d}{2} + \frac{1}{\varepsilon_{r2}} \cdot \frac{d}{2} \right) =$$

$$= \frac{d \cdot D}{2 \varepsilon_0} \cdot \left(\frac{1}{\varepsilon_{r1}} + \frac{1}{\varepsilon_{r2}} \right) = U$$

$$D = \frac{U \cdot 2 \varepsilon_0}{d \left(\frac{1}{\varepsilon_{r1}} + \frac{1}{\varepsilon_{r2}} \right)}$$

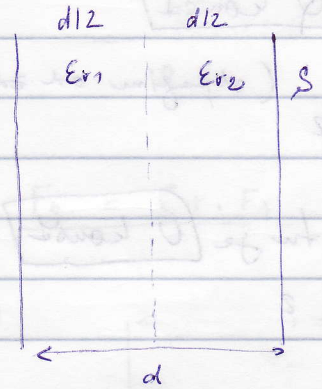
$$E_{e1} = \frac{D}{\varepsilon_{r1} \cdot \varepsilon_0} = \frac{U \cdot 2}{d \cdot \varepsilon_{r1} \left(\frac{1}{\varepsilon_{r1}} + \frac{1}{\varepsilon_{r2}} \right)}$$

$$P = \varepsilon_0 \cdot E_e \cdot (\varepsilon_{r1} - 1)$$

28, 29, 30

Oricenii

PR



S, d, ε_{r1}

$C = \frac{Q}{U}$

$D = E \cdot \varepsilon_0 \varepsilon_r \Rightarrow$

$\Rightarrow E = \frac{D}{\varepsilon_0 \varepsilon_r}$

$$U = \int \bar{E} \cdot d\bar{r} = \int \bar{E}_1 d\bar{r} + \int \bar{E}_2 d\bar{r} = E \uparrow\uparrow dr = \int E_1 dr + \int E_2 dr =$$

$$= \frac{D}{\varepsilon_0} \left[\int \frac{1}{\varepsilon_{r1}} + \int \frac{1}{\varepsilon_{r2}} \right] = \frac{D}{\varepsilon_0} \cdot \left(\frac{d}{2 \varepsilon_{r1}} + \frac{d}{2 \cdot \varepsilon_{r2}} \right) =$$

$S \cdot \sigma_v$

$$= \frac{D \cdot d}{2 \varepsilon_0} \left(\frac{1}{\varepsilon_{r1}} + \frac{1}{\varepsilon_{r2}} \right)$$

$$C = \frac{S \cdot \sigma_v \cdot 2 \varepsilon_0}{\sigma_v \cdot d \cdot \left(\frac{1}{\varepsilon_{r1}} + \frac{1}{\varepsilon_{r2}} \right)}$$

altfel $\quad \frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$

$$\frac{1}{C} = \frac{1}{\varepsilon_0 \varepsilon_{r1} \cdot \frac{S}{d/2}} + \frac{1}{\varepsilon_0 \varepsilon_{r2} \cdot \frac{S}{d/2}}$$