C. L. Ohm și T. Kirchhoff

$$u + e = R \cdot i$$

$\sigma = \frac{1}{\rho}$ - caract. sarcinile
- caract. dim. p.d.V a conductiei
ε - cau. a pol. subst
μ - o măsura a caract. mediul
d.p.d.V magnetic

$$\bar{E} + \bar{E}_i = \rho \cdot \bar{j}$$

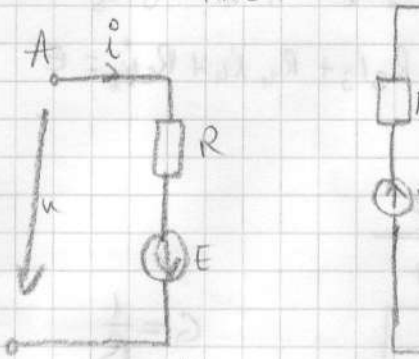
$$R = \int_{(L)} \rho \cdot \frac{dl}{A}$$

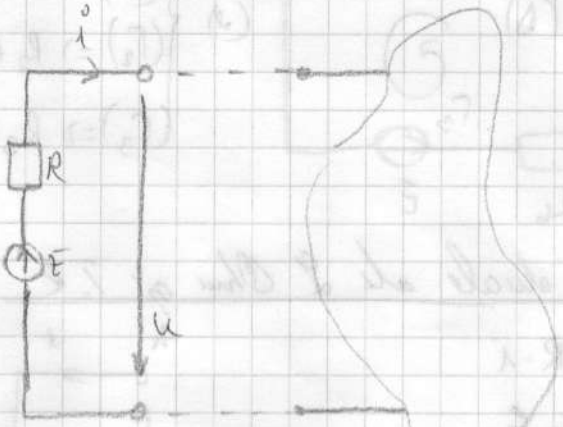
$$[R] = 1[\Omega]$$

$$R = \rho \cdot \frac{l}{A}$$

$$[\rho] = \frac{1\Omega}{1m}$$

$i \to u$
$u \to i$
$e \to i_{sc}$
$R \to G$





$$u - e = -Ri$$

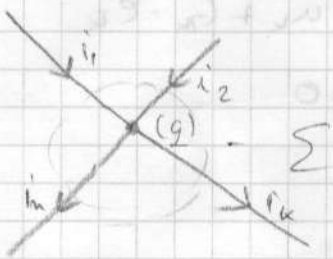
$$e = u - R \cdot i$$

$$P = u \cdot i = R \cdot i^2$$

$$\begin{cases} N - 1 = n \\ L - N + 1 = e \end{cases}$$

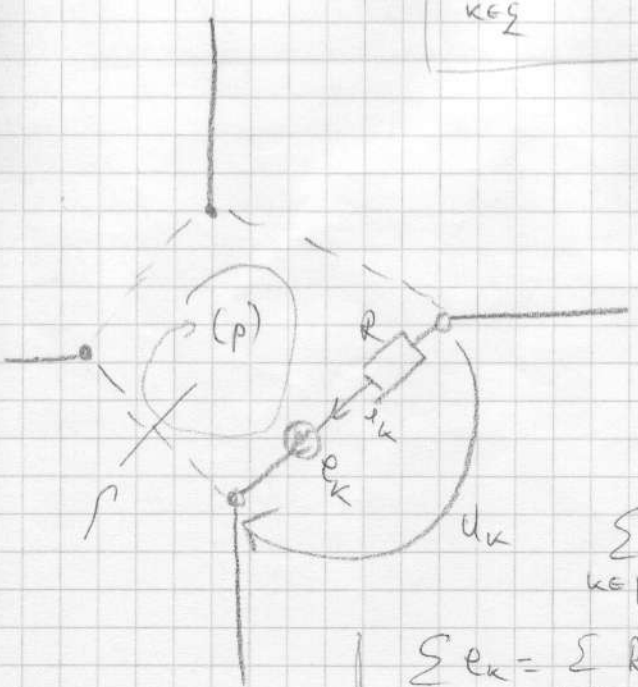
$$i_\Sigma = -\frac{dq_\Sigma}{dt}$$

$$i_\Sigma = 0$$



$$-i_1 - i_2 + i_k + \dots + i_n = 0$$

$$\sum_{k \in \Sigma} i_k = 0$$



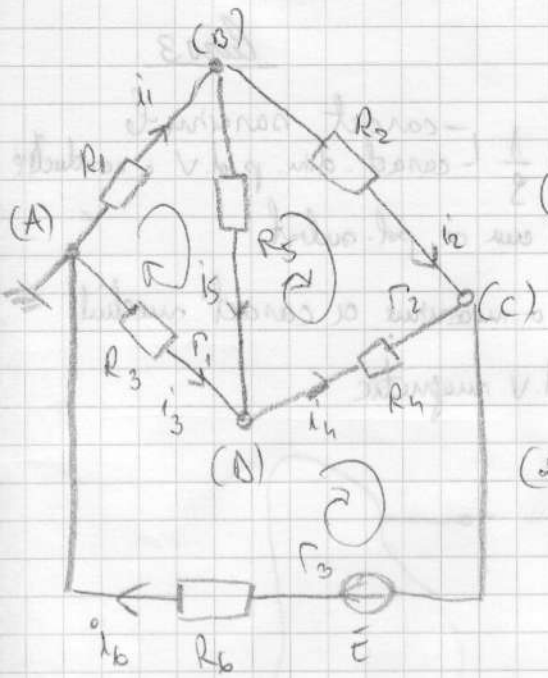
$$u_k + e_k = R_k \cdot i_k$$

$$\oint_\Gamma \bar{E} \cdot \bar{dl} = 0$$

$$\sum_\Gamma u_k = 0$$

$$\sum_{k \in p} u_k + \sum_{k \in p} e_k = \sum_{k \in p} R_k \cdot i_k$$

$$\sum_{k \in p} e_k = \sum_{k \in p} R_k \cdot i_k$$ - T. II K



$$\begin{cases} N=4 \Rightarrow 3 \text{ ec} \\ L=6 \Rightarrow 3 \text{ ec} \end{cases}$$

$$(1)\ \begin{cases} i_1 = i_2 + i_5 \\ i_2 + i_4 = i_6 \\ i_3 + i_5 = i_4 \end{cases}$$

$$(2)\ \begin{cases} (\Gamma_1) \Rightarrow R_1 i_1 + R_5 i_5 - R_3 i_3 = 0 \\ (\Gamma_2) \Rightarrow R_2 i_2 - R_4 i_4 - R_5 i_5 = 0 \\ (\Gamma_3) \Rightarrow R_3 i_3 + R_4 i_4 + R_6 i_6 = E \end{cases}$$

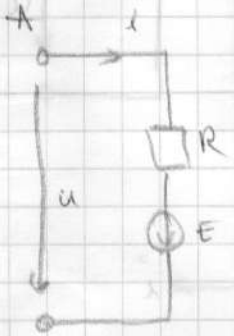
1. Forma duală a L. Ohm și T. K

$$u + e = R \cdot i$$

$$i = \frac{u}{R} + \frac{e}{R}$$

$$\boxed{i = G \cdot u + G \cdot e}$$

$$\boxed{i - i_{sc} = G \cdot u}$$



$$G = \frac{1}{R}$$

$$i = \frac{e}{R} = e \cdot G$$

$$\begin{cases} \sum_{k \in Q} i_k = 0 \\ \sum_{k \in P} R_k \cdot i_k = \sum_{k \in P} e_k \end{cases}$$

$$\boxed{\sum_{k=p} u_k = 0}$$

$$i_k = G \cdot u_k + G_k \cdot e_k$$

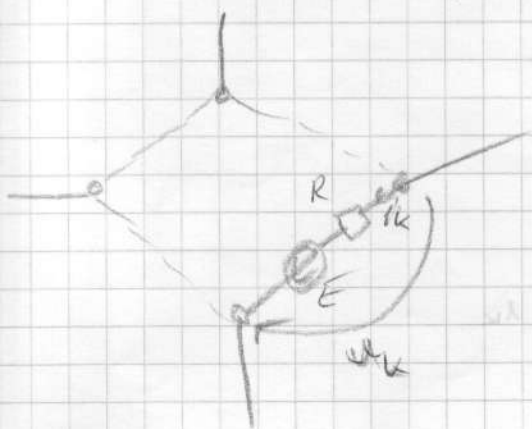
$$\sum_{k \in Q} i_k = 0$$

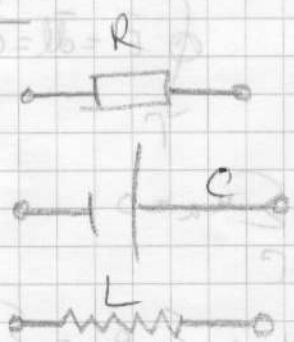
$$\boxed{\sum_{k \in Q} G_k \cdot u_k = -\sum_{k \in Q} i_{sc\,k}}$$

$$\sum_{k \in P} u_k = 0$$

$$\sum_{k \in Q} i_k = 0$$

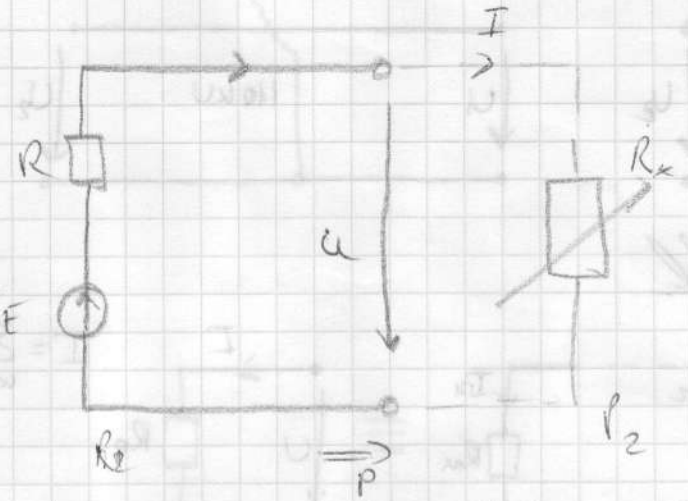
E. Teorema conservării puterilor





$$\boxed{\sum R_k \cdot I_k = \sum R_k \cdot I_k^2}$$

$P = U \cdot I = R \cdot I^2$



$$\boxed{I = \frac{E}{R_1 + R_2}}$$

$U = E - R_1 I$

$R_x \cdot I = E - R_1 I$

$E = I(R_1 + R_x)$

$\Rightarrow P$

$P = U \cdot I = R \cdot I^2 = \frac{U^2}{R}$

$P_2 = R_x \cdot I^2 = E^2 \cdot \frac{R_x}{(R_1+R_2)^2}$

$\eta = \frac{P_2}{P_1} = \frac{E^2 \cdot R_x}{(R_1+R_x)^2} \cdot \frac{R_1+R_x}{E^2}$

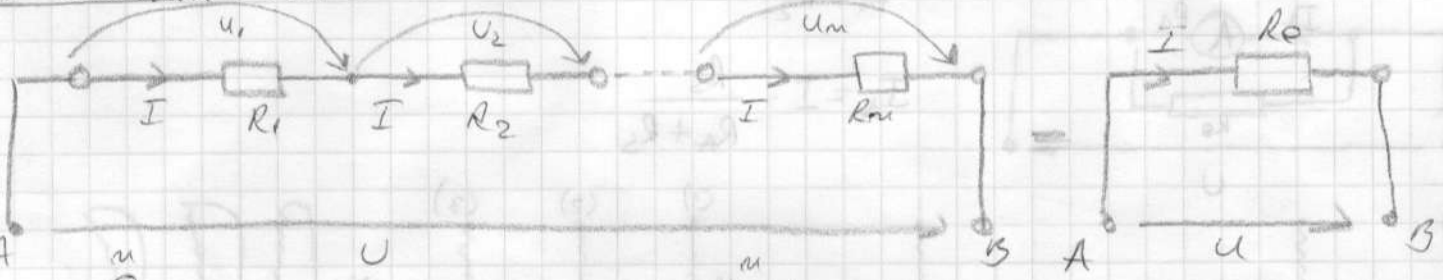
$\frac{\partial P_2}{\partial R_x} = 0 \Rightarrow R_1 = R_x$

$\eta = \frac{R_x}{R_1+R_x}$; $R_1 = R_x \Rightarrow \boxed{\eta = 50\%}$

1.2. Transformarea schemelor în circuite de curent continuu

A. Conexiunea baterilor pentru curent

1. Conexiunea serie



$U = \sum_{k=1}^{n} U_k = R_1 I + R_2 I + \ldots + R_m I = I \sum_{k=1}^{n} R_k$

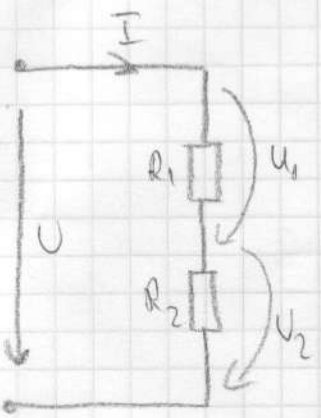
$U = R_e \cdot I$

$\boxed{R_e = \sum_{k=1}^{n} R_k}$

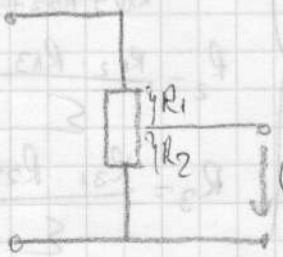
$R_k > 0$

$R_e > R_k$

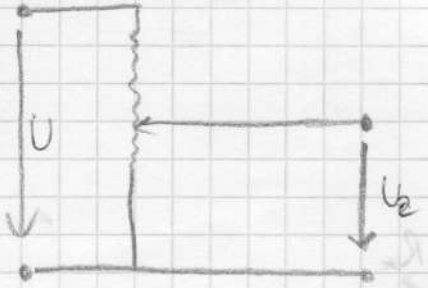
$R_e = R_1 + R_2$

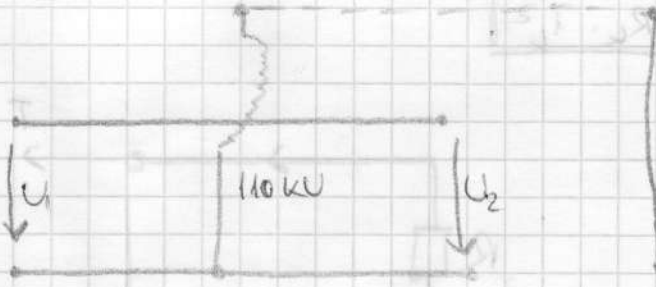


$I = \frac{U}{R_1+R_2} \Rightarrow \begin{cases} U_1 = IR_1 = U\frac{R_1}{R_1+R_2} \\ U_2 = U\frac{R_2}{R_1+R_2} \end{cases}$

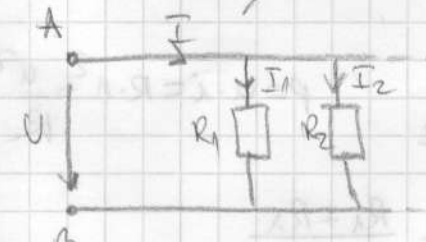


$R = \rho \cdot \frac{l}{A}$





2. Conexiune paralel



$$I = \sum_{k=1}^{n} I_k = \frac{U}{R_1} + \frac{U}{R_2} + \dots + \frac{U}{R_n} = U \sum_{k=1}^{n} \frac{1}{R_k}$$

$U = I \cdot R_e$ $\quad I = U \cdot G_e$

$$G_e = \sum_{k=1}^{n} \frac{1}{R_k}$$

$\frac{1}{R_k} > 0$

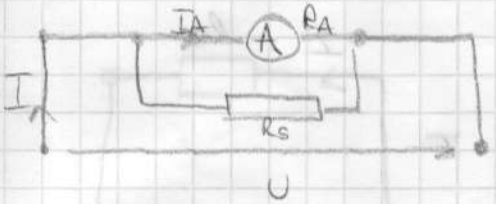
$G_e > G_k$

$R_e < R_k$

$$\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2}$$

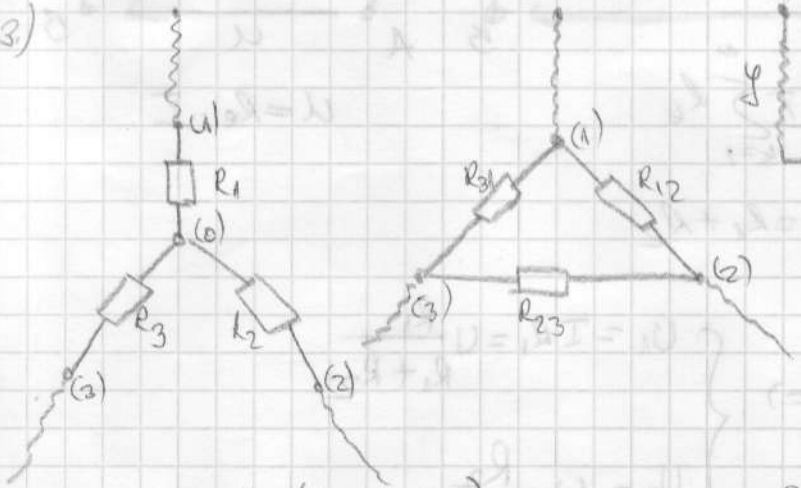
$$R_e = \frac{R_1 \cdot R_2}{R_1 + R_2} \qquad I = \frac{U(R_1 + R_2)}{R_1 \cdot R_2}$$

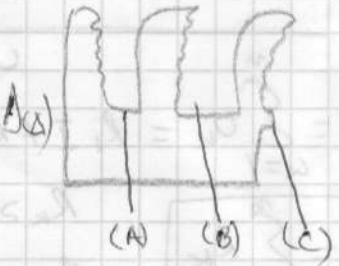
$$I_1 = I \cdot \frac{R_2}{R_1 + R_2} \qquad I_2 = I \cdot \frac{R_1}{R_1 + R_2}$$



$$I_A = I \cdot \frac{R_S}{R_A + R_S}$$

3.)





$$\begin{cases} R_1 + R_2 = \dfrac{R_{12}(R_{23} + R_{31})}{R_{12} + R_{23} + R_{31}} \\ R_3 + R_1 = \dfrac{R_{31}(R_{12} + R_{23})}{\Sigma} \\ R_2 + R_3 = \dfrac{R_{23}(R_{12} + R_{31} + R_{31})}{\Sigma} \end{cases} \quad (-1)$$

$$\begin{cases} R_1 = \dfrac{R_{12} \cdot R_{31}}{R_{12} + R_{23} + R_{31}} \\ R_2 = \dfrac{R_{12} \cdot R_{13}}{\Sigma} \\ R_3 = \dfrac{R_{31} \cdot R_{23}}{\Sigma} \end{cases}$$