七、电学

$U = IR$

串联 I相等 U正比于R　　$R_{总} = R_1 + R_2 + \cdots + R_n$　　n个R串 $R_{总} = n \cdot R$

并联 U相等 I反比于R　　$\frac{1}{R_{总}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}$　　n个R并 $R_{总} = \frac{R}{n}$

R_1并R_2，$R_{总} = \frac{R_1 R_2}{R_1 + R_2}$

1、功率

$P =$ 纯电阻 $\begin{cases} UI & \text{总功率} \\ I^2R & \text{热功率} \quad \text{串联} \\ \frac{U^2}{R} & \text{并联} \end{cases}$

电动机 $\begin{cases} P_{总/电} = UI \\ P_{热} = I^2R \\ P_{出/机} = UI - I^2R > 0 \end{cases}$

$\eta = \frac{P_{出}}{P_{总}} = \frac{UI_1 - I_1^2R}{UI_1}$

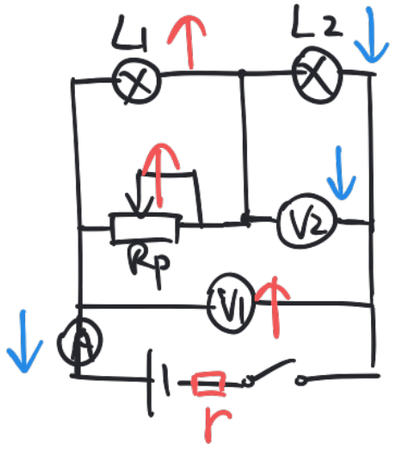
$\eta = 1 - \frac{I_1}{I_2} = \frac{I_2 - I_1}{I_2} \times 100\%$

正常工作 $U > I_1R$

卡住 $U = I_2R$

$I_2 > I_1$，容易烧毁

2. 动态分析　　串反并同.



R_p↑ $R_{总}$↑ I_0↓

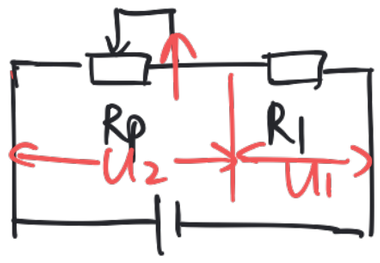
U_1↑ U_2↓

L_1亮 L_2暗

电源 $\begin{cases} \text{无}r & U_1\text{不变} \\ \text{有}r & U_1\text{变大.} \end{cases}$

电源有内阻r ⇒ 不路串联r

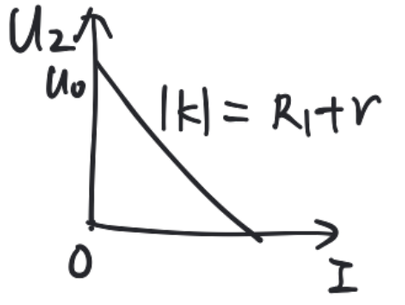
$U_0 = U + I_0 r$



R_p↑ I_0↓ U↑

U_1↓ U_2↑

$U = U_1 + U_2$ ⇒ $|\Delta U_2| > |\Delta U_1|$



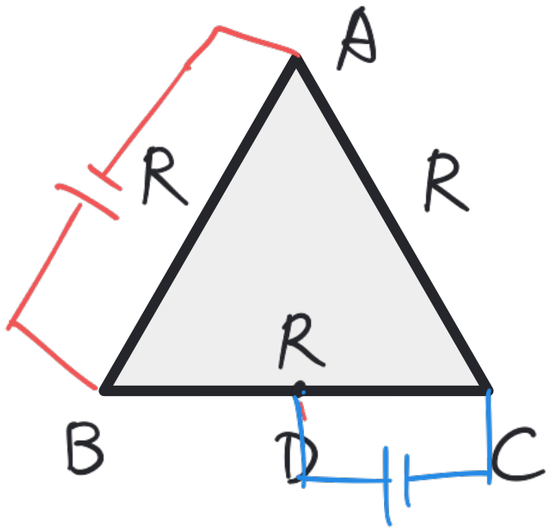
$U_2 = U_0 - I(R_1 + r)$

定值R_1：$\frac{U_1}{I} = R_1$ 不变　　$\frac{\Delta U_1}{\Delta I} = R_1$ 不变

滑变R_p：$\frac{U_2}{I} = R_2$ 变大　　☆ $\frac{\Delta U_2}{\Delta I} = R_1 + r$ 不变.

3. 电路化简.

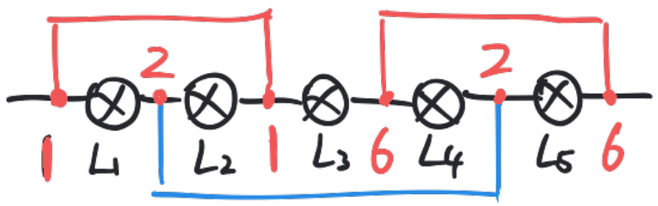
AB间等效电阻 = AB接电源后的总电阻

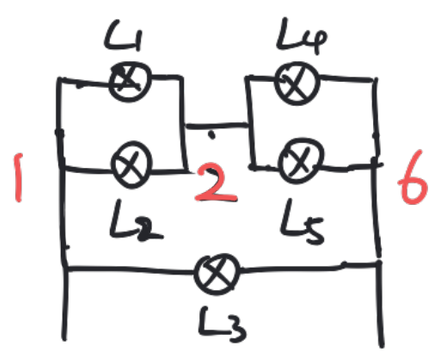


$$R_{AB}=\frac{R\cdot 2R}{R+2R}=\frac{2}{3}R\neq R$$

$$R_{CD}=\frac{\frac{R}{2}\cdot\frac{5}{2}R}{\frac{R}{2}+\frac{5}{2}R}=\frac{5}{12}R\neq\frac{R}{2}$$

节点法





① 找节点个数 n

② 标号 正极 1 负极 n

导线直接相连标用号. (本质, 导线R=0, 故两端U=0)

③ 序号依次排列.

填入用电器R