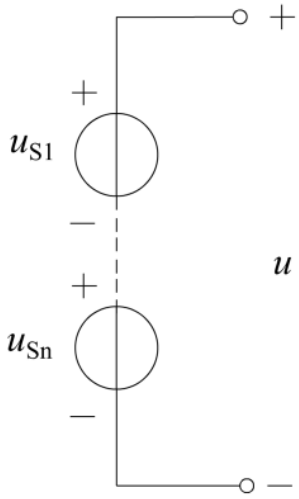
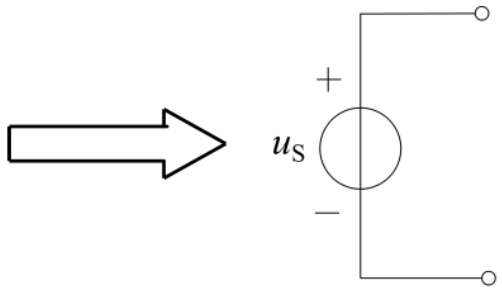
2-3　电压源、电流源的串联和并联

1、理想电压源的串联和并联

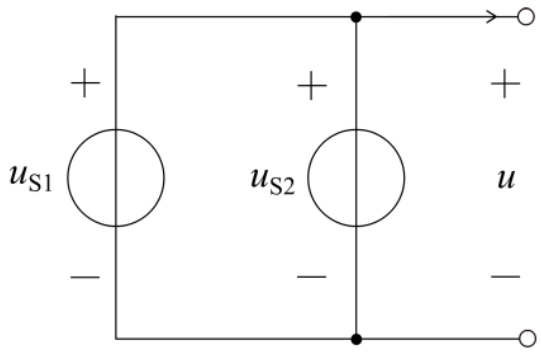


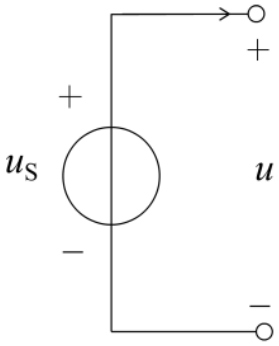
由KVL可知：

$$u = u_{S1} + u_{S2} + \ldots + u_{Sn} = \sum_{k=1}^{n} u_{Sk}$$



$$u_S = u_{S1} + u_{S2} + \ldots + u_{Sn} = \sum_{k=1}^{n} u_{Sk}$$

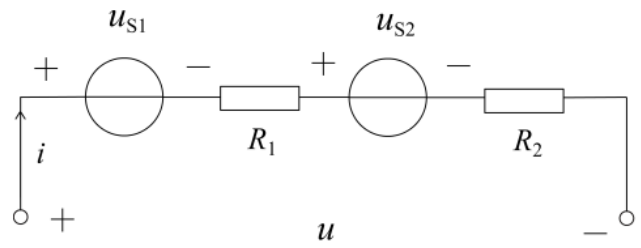




根据KVL　$u = u_{S1} = u_{S2}$　　$u_S = u_{S1} = u_{S2}$

注意，相同的理想电压源才能并联。

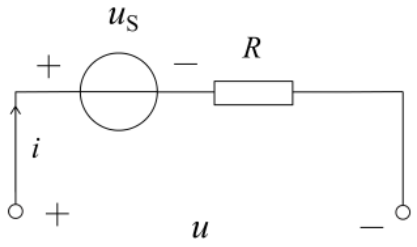
电压源与支路的串、并联等效



根据KVL

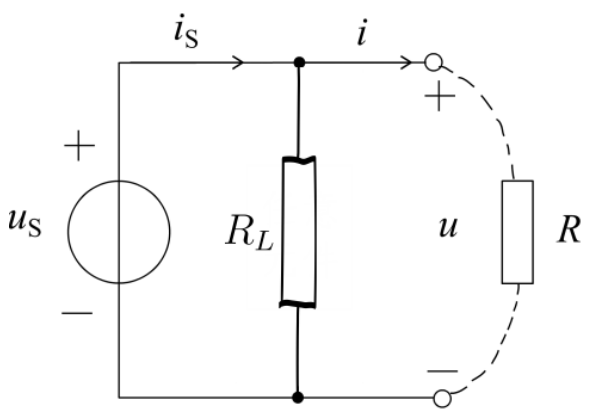
$$u = u_{S1} + R_1 i + u_{S2} + R_2 i$$

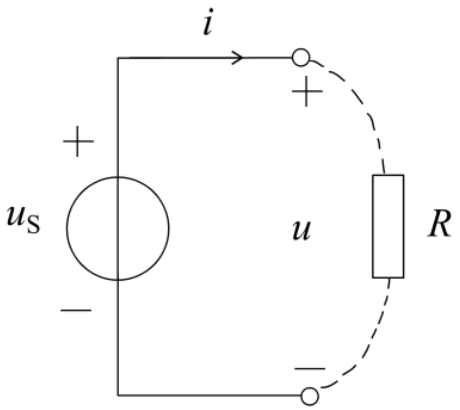
$$= \underbrace{u_{S1} + u_{S2}}_{u_S} + \underbrace{(R_1 + R_2)}_{R} i$$



图中 $u_S = (u_{S1} + u_{S2})$

$R = (R_1 + R_2)$

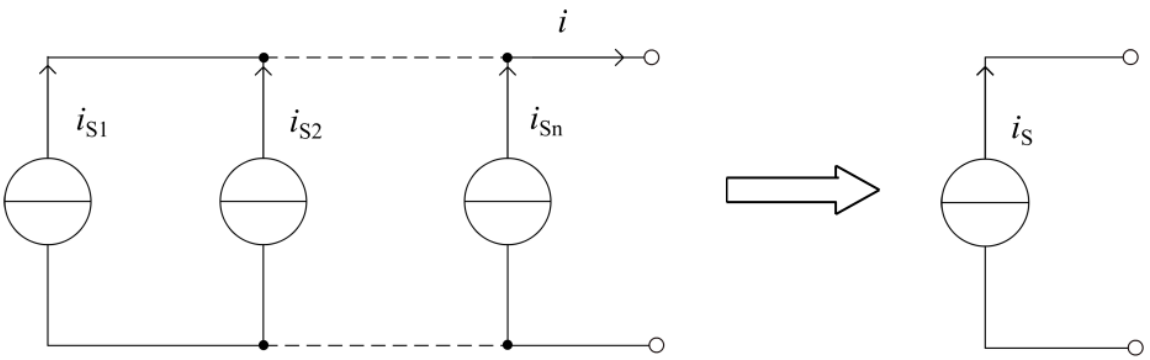




外电路R电流 $i = \dfrac{u_s}{R}$ 等效是对外等效的。 $i = \dfrac{u_s}{R}$

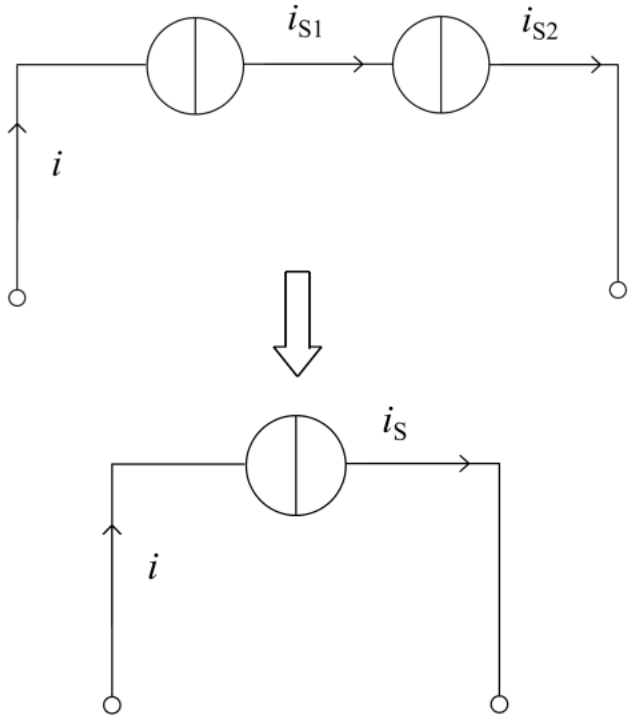
电压源电流 $i_s = \dfrac{u_s}{R} + \dfrac{u_s}{R_L}$ 对内不等效。 $i_s = i = \dfrac{u_s}{R}$

2. 理想电流源的串联和并联



由KCL，总电流 $i_S = i_{S1} + i_{S2} + ... + i_{Sn} = \sum i_{Sk}$

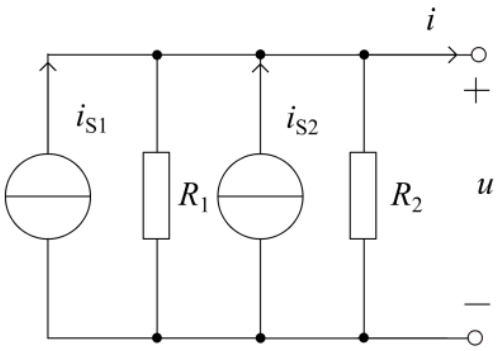
$$i = i_{S1} + i_{S2} + ... + i_{Sn} = \sum i_{Sk}$$



$$i = i_{S1} = i_{S2}$$

$$i_S = i_{S1} = i_{S2}$$

电流源与支路的串、并联等效

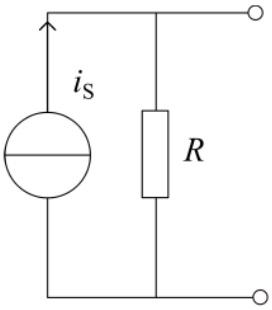


根据KCL

$$i = i_{S1} - \frac{u}{R_1} + i_{S2} - \frac{u}{R_2}$$

$$= i_{S1} + i_{S2} - (\frac{1}{R_1} + \frac{1}{R_2})u$$

$$= i_S - \frac{u}{R}$$



图中 $i_S = (i_{S1} + i_{S2})$ $\frac{1}{R} = (\frac{1}{R_1} + \frac{1}{R_2})$