

实验作业 2

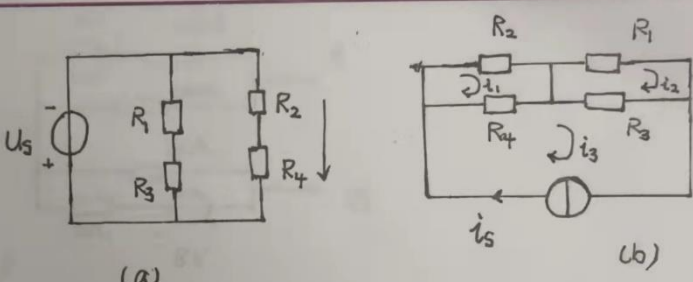
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理论计算如下：

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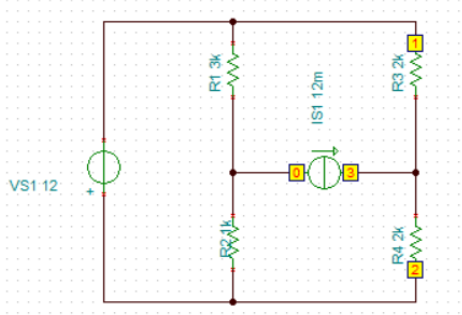



叠加定理：图 a: $U_{R4,a} = \frac{-U_s R_4}{R_2 + R_4} = -6 \text{ V}$

图 b:
$$\begin{cases} 4i_1 - 2i_3 = 0 \\ 4i_2 - i_3 = 0 \\ U_{R4,b} = (i_3 - i_1) R_4 \end{cases} \Rightarrow U_{R4,b} = 12 \text{ V}$$

$\therefore U_{R4} = U_{R4,a} + U_{R4,b} = 6 \text{ V}$

仿真实验如下：

名称	值
I_VS1[2, 1]	-9mA
V_IS1[0, 3]	-18V
V_R1[0, 1]	1.36V
V_R2[2, 0]	12V
V_R3[3, 1]	18V
V_R4[2, 3]	-6V
V_VS1[2, 1]	12V

外观：
☒ 节点电压
☒ 其它电压
☒ 电流
☒ 输出

取一致的参考方向： $U_{R4}=6\text{V}$

即, U_{R4} 理论值与实际值相等
即可以验证叠加定理。

二 .

理论计算如下:

理论计算:

Diagram (a) shows the equivalent circuit for finding R_{eq} looking into terminals A and B. It consists of two parallel branches: one with two $2k\Omega$ resistors in series, and another with a $1k\Omega$ resistor in series with a parallel combination of two $1k\Omega$ resistors.

Diagram (b) shows the circuit for finding the short-circuit current i_{sc} . It includes a $16V$ source, an $8V$ source, and three resistors with currents i_1 , i_2 , and i_3 indicated.

Diagram (c) shows the final Thevenin equivalent circuit with a $4V$ source in series with a $1.5k\Omega$ resistor, connected to a load resistor of $2k\Omega$ across terminals A and B.

可知: $R_{eq} = \frac{1}{\frac{1}{2} + \frac{1}{2}} + \frac{1}{1+1} = 1.5 k\Omega$

有:

$$\begin{cases} 4000i_1 - 2000i_2 = 16 \\ 3000i_2 - 2000i_1 - 1000i_3 = 0 \\ 2000i_3 - 1000i_2 = -8 \end{cases}$$

\Downarrow

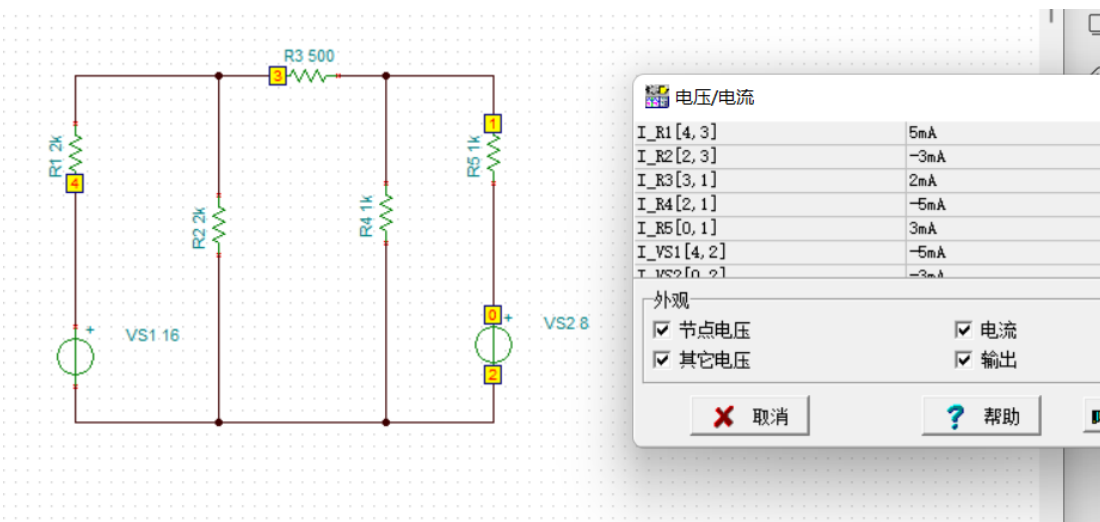
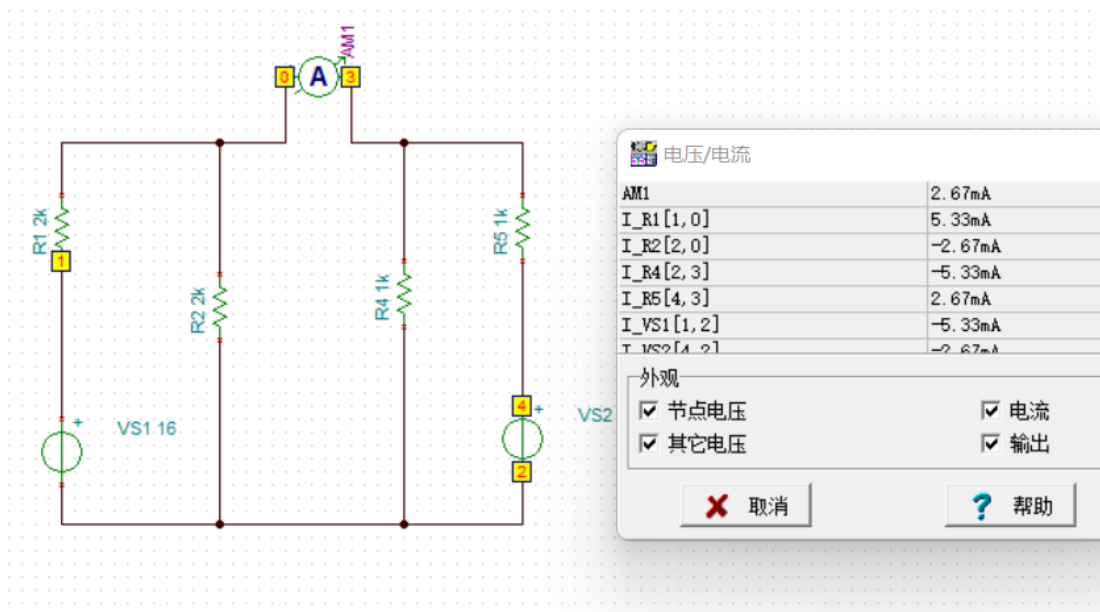
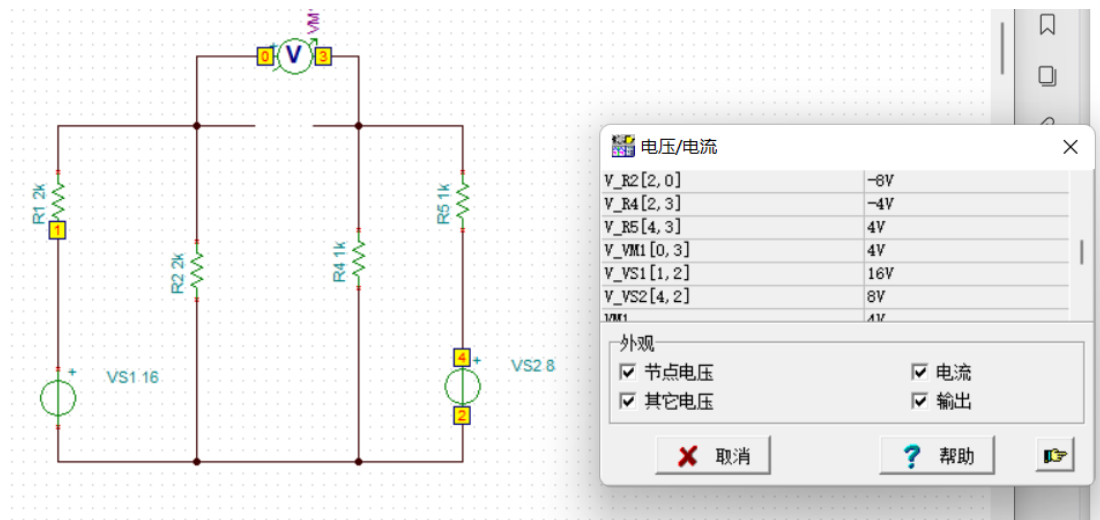
$$i_{sc} = i_2 = \frac{1}{375} A$$

可知: $U_{oc} = i_{sc} R_{eq} = 4 V$

由戴维宁可等效为图C:

$$I_{RL} = \frac{U_{oc}}{R_{eq} + R_L} = \frac{4V}{2k\Omega} = 2 mA$$

仿真实验如下:



即实际值:

$$I_{sc} = 1/375 \text{ A} = 2.67 \text{ mA}$$

$$U_{oc} = 4V$$

$$I_{RL} = 2 \text{ mA}$$

$$R_{eq} = 1500 \Omega$$

可得 ：

即:理论值与实际值相等，可以验证戴维宁定理。