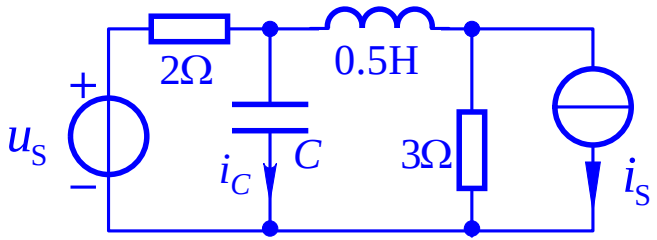
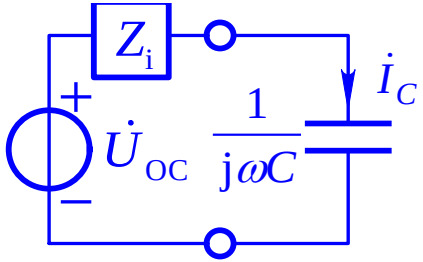
正弦稳态电路相量分析法

例4 图示电路,已知C=0.05F 时，$i_C = 5\sqrt{2}\cos(10t - 60^\circ)\text{A}$，求当$C$=0.25F 时，$i_C$ = ？





$$Z_i = \frac{2\times(3+j5)}{2+3+j5}\Omega = (1.6+j0.4)\Omega$$

当$C = 0.05\text{F}$时，

$$\dot{U}_{OC} = (Z_i + \frac{1}{j\omega C})\dot{I}_C = 8\sqrt{2}\angle -105^\circ \text{V}$$

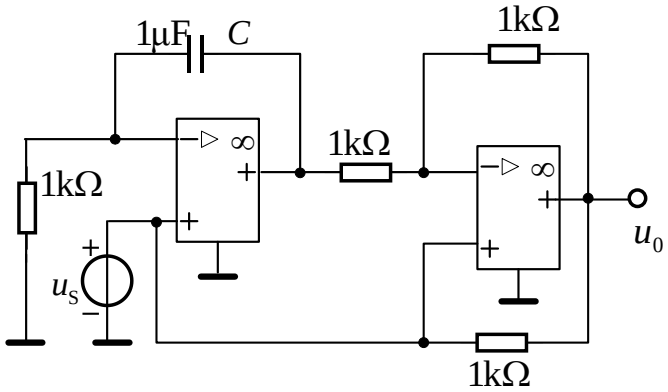
当$C = 0.25\text{F}$时，

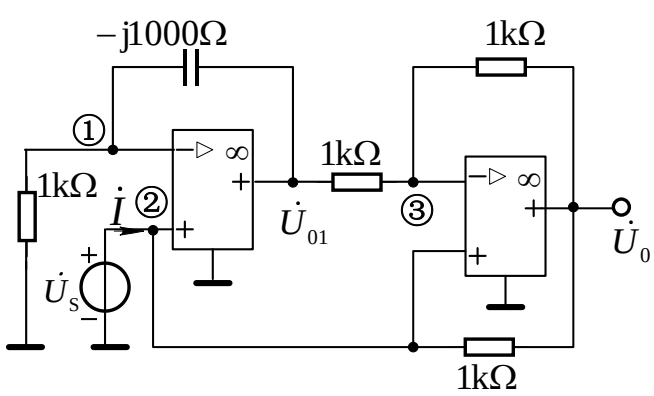
$$\dot{I}_C = \frac{\dot{U}_{OC}}{Z_i + 1/j\omega C} = 5\sqrt{2}\angle -105^\circ \text{A}$$

$$i_C = 10\cos(10t - 105^\circ)\text{A}$$

正弦稳态电路相量分析法

例5 图示已知 $u_S=100\sqrt{2}(\cos 10^3 t+45^\circ)\text{V}$ 。试确定输出 u_0 及输入阻抗 Z。





解：频域电路如图所示

$$\dot{U}_S=\dot{U}_{n1}=\dot{U}_{n2}=\dot{U}_{n3}=100\angle 45^\circ\ \text{V}$$

$$(\frac{1}{1000}+\text{j}\frac{1}{1000})\dot{U}_{n1}-\text{j}\frac{1}{1000}\dot{U}_{01}=0$$

$$-\frac{1}{1000}\dot{U}_{01}+(\frac{1}{1000}+\frac{1}{1000})\dot{U}_{n3}-\frac{1}{1000}\dot{U}_0=0$$

$$\dot{I}=\frac{1}{1000}(\dot{U}_{n2}-\dot{U}_0)$$

$$Z=\dot{U}_S/\dot{I}$$

$$=1000\angle 90^\circ\ \Omega$$

得

$$\dot{U}_{01}=100\sqrt{2}\angle 0^\circ\ \text{V},\ \dot{U}_0=100\sqrt{2}\angle 90^\circ\ \text{V},\ \dot{I}=0.1\angle -45^\circ\ \text{A}$$

$$u_0=200(\cos 10^3 t+90^\circ)\ \text{V}$$