8-4 已知三个同频率的正弦电流：$i_1=10\sin(\omega t+120°)A$，$i_2=20\cos(\omega t-150°)A$，$i_3=-30\cos(\omega t-30°)A$。试比较它们的相位差。

解：
$$i_1=10\sin(\omega t+120°)=10\cos(\omega t+30°)A$$
$$i_2=20\cos(\omega t-150°)A$$
$$i_3=-30\cos(\omega t-30°)=30\cos(\omega t+150°)A$$
$$\therefore \theta_{12}=30°-(-150°)=180°$$
$$\theta_{23}=-150°-150°=-300°\Rightarrow \theta_{23}=60°$$
$$\theta_{31}=150°-30°=120°$$

8-5 试求下列正弦量的振幅向量和有效值向量：

$(1) i_1 = 5\cos\omega t A$ $(2) i_2 = -10\cos(\omega t + \frac{\pi}{2}) A$

$(3) i_3 = 15\sin(\omega t - 135°) A$

解：$(1) i_1 = 5\cos\omega t A \Rightarrow \dot{I}_{1m} = 5\angle 0° A, \dot{I}_1 = 2.5\sqrt{2}\angle 0° \approx 3.54\angle 0° A$

$$(2) i_2 = -10\cos(\omega t + \frac{\pi}{2}) = 10\cos(\omega t - \frac{\pi}{2})$$

$$\Rightarrow \dot{I}_{2m} = 10\angle -\frac{\pi}{2} A, \dot{I}_2 = 5\sqrt{2}\angle -\frac{\pi}{2} A$$

$$(3) i_3 = 15\sin(\omega t - 135°) = 15\cos(\omega t - 225°) = 15\cos(\omega t + 135°)$$

$$\Rightarrow \dot{I}_{3m} = 15\angle 135° A, \dot{I}_3 = 7.5\sqrt{2}\angle 135° A \approx 10.605\angle 135° A$$

8-6　已知 $\omega=314\text{rad/s}$，试写出下列相量所代表的正弦量。

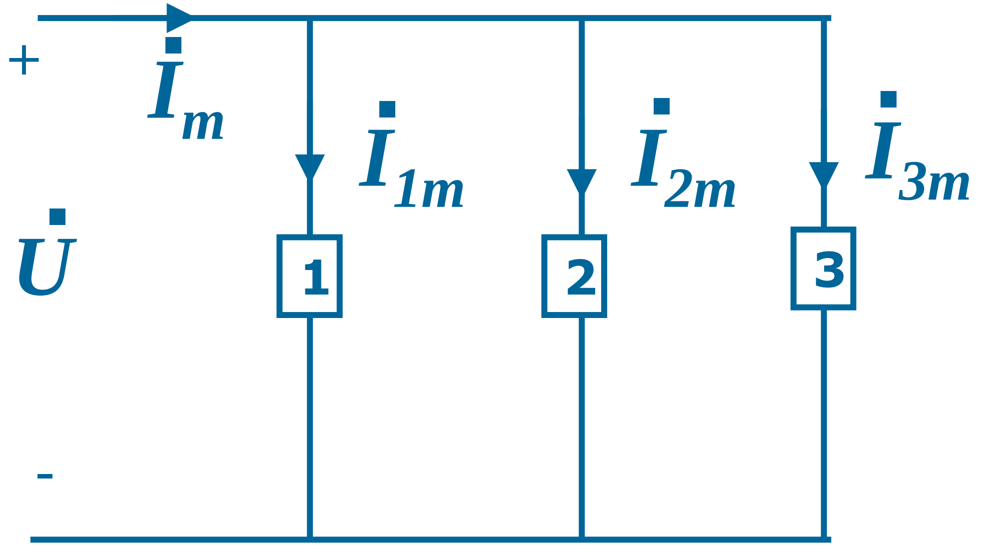
(1) $\dot{I}_1 = 10\angle\frac{\pi}{2}\text{A}$　　(2) $\dot{I}_{2m} = 2\angle\frac{3}{4}\pi\text{A}$

(3) $\dot{U}_1 = 3 + \text{j}4\text{V}$　　(4) $\dot{U}_{2m} = 5 + \text{j}5\text{V}$

(1) $i_1(t) = 10\sqrt{2}\cos(314t + \frac{\pi}{2})\text{A}$　　(2) $i_2(t) = 2\cos(314t + \frac{3}{4}\pi)\text{A}$

(3) $u_1(t) = 5\sqrt{2}\cos(314t + 53.1^\circ)\text{V}$　　(4) $u_2(t) = 5\sqrt{2}\cos(314t + 45^\circ)\text{V}$

8-10 电路如题图7-10所示，已知 $u=100\cos(10t+45^0)$V,$i_1=i=10\cos(10t+45^0)$A $i_2=20\cos(10t+135^0)$A.试判断元件1,2,3的性质及数值。



解：本题利用KCL及元件VCR相量形式分析

$$\dot{U}_m = 100\angle 45°V,$$

$$\dot{\mathrm{I}}_{\mathrm{m}} = \dot{I}_{1m} = 10\angle 45° A,$$

$$\dot{I}_{2m} = 20\angle 135° A$$

由KCL相量形式得

$$\dot{I}_{3m} = \dot{I}_m - \dot{I}_{1m} - \dot{I}_{2m} = 10\angle 45° - 10\angle 45° - 20\angle 135°$$

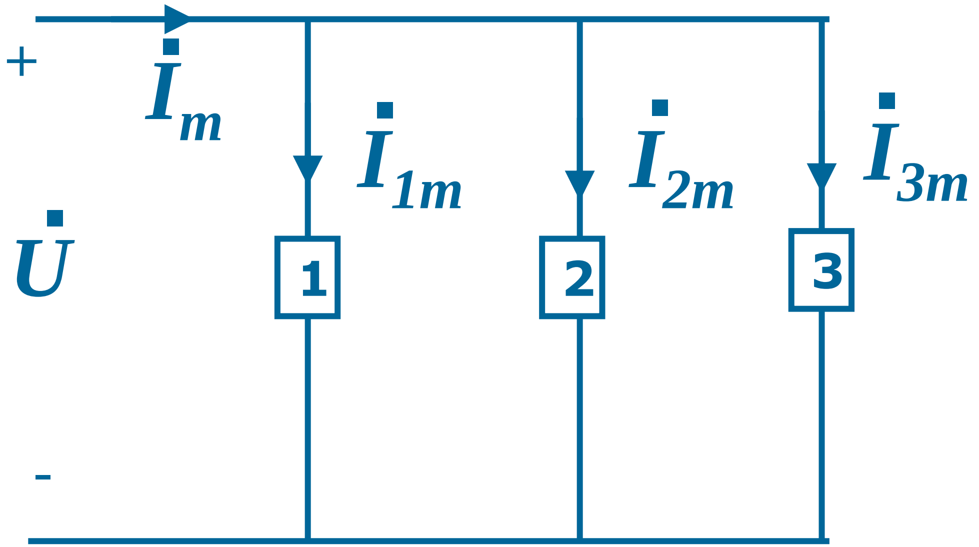
$$= -20\angle 135° = 20\angle -45° A$$

对于元件1

$$\dot{U}_m = 100\angle 45°V,$$

$$\dot{I}_{1m} = 10\angle 45° A,$$

由于其电压电流同相，故其为电阻元件，且



$$R = \frac{\dot{U}_m}{\dot{I}_{1m}} = \frac{100\angle 45°}{10\angle 45°} = 10\Omega$$

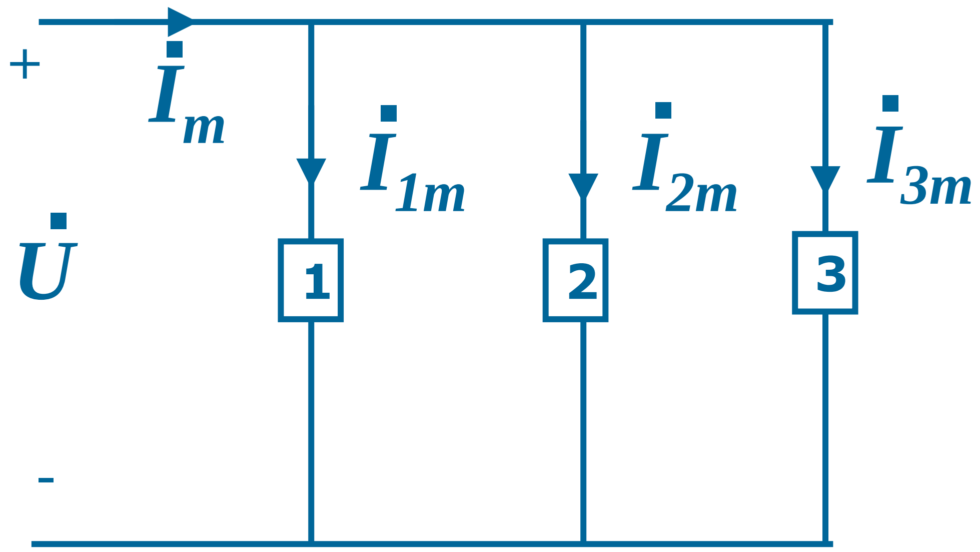
对于元件2

$$\dot{U}_m = 100\angle 45°V,$$

$$\dot{I}_{2m} = 20\angle 135° A,$$

由于其电流超前电压90º，故其为电容元件，且

$$\omega C = \frac{I_m}{U_m} = \frac{20}{100} = \frac{1}{5}\Omega, \quad C = \frac{1}{50}F$$



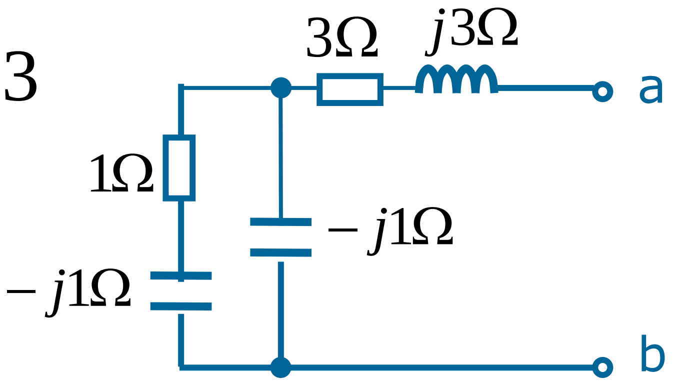
对于元件3

$$\dot{U}_m = 100\angle 45°V,$$
$$\dot{I}_{3m} = 20\angle -45°A,$$

由于其电流滞后电压90º，故其为电感元件，且

$$\omega L = \frac{U_m}{I_{3m}} = \frac{100}{20} = 5\Omega, \quad L = 0.5H$$

8-13　试求题图7-13所示电路的输入阻抗和导纳，以及该电路的最简串联等效电路和并联等效电路$\omega = 10 rad/s$。

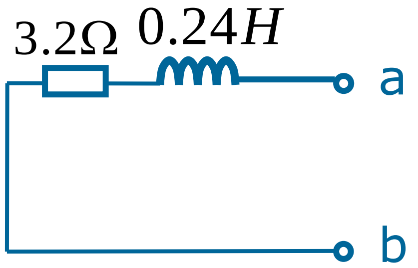


解：

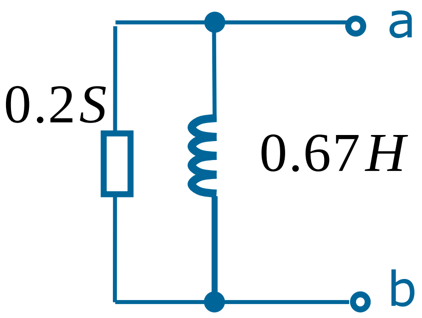
$$Z_{ab} = \frac{(1-j1)(-j1)}{(1-j1)+(-j1)} + 3 + j3$$

$$= \frac{-1-j1}{1-j2} + 3 + j3$$

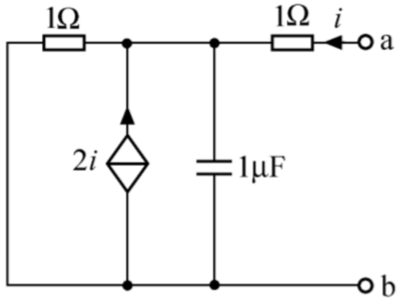
$$= \frac{1-j3}{5} + 3 + j3 = 3.2 + j2.4\Omega$$



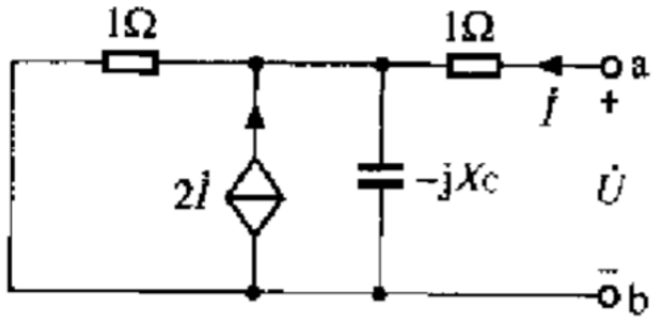
$$Y_{ab} = \frac{1}{Z_{ab}} = \frac{1}{\frac{16}{5} + j\frac{12}{5}} = 0.2 - j0.15S$$



8-15 a 试求题图 8-15 所示各二端网络的输入阻抗。



(a) $\omega=10^6$rad/s



作题图8-15（a）的向量模型如解图8-15（a）所示。由于电路中含有受控源，故用加压求流法求其等效阻抗。设在解图 7-15（a）端子上加电压 $\dot{U}$，此时端子上电流为 $\dot{I}$，参考方向如图所示，由 KVL 得

$$\dot{U}=\dot{I}+1\,//\,(-\mathrm{j}1)\times(\dot{I}+2\dot{I})$$

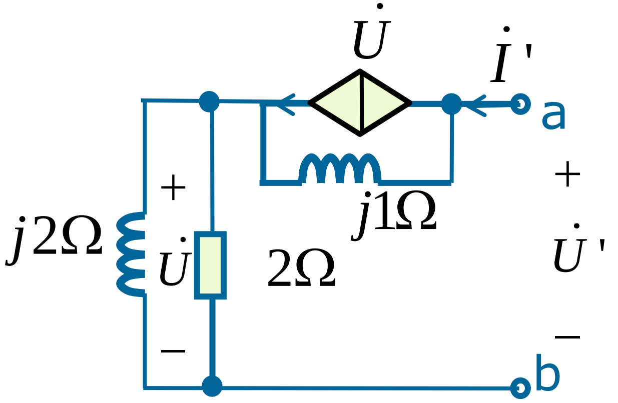
$$=\dot{I}+\frac{-\mathrm{j}1}{1-\mathrm{j}1}\times 3\dot{I}=\frac{1-\mathrm{j}4}{1-\mathrm{j}1}\dot{I}$$

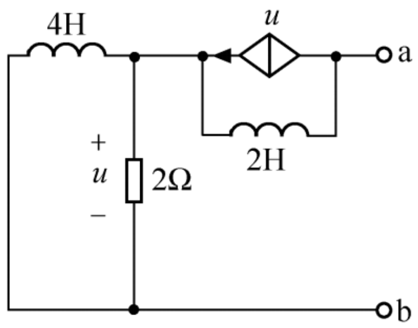
故

$$Z_{ab}=\frac{\dot{U}}{\dot{I}}=\frac{1-\mathrm{j}4}{1-\mathrm{j}1}=\frac{5}{2}-\mathrm{j}\,\frac{3}{2}\Omega$$

8-15b　试求题图7-15所示各二端网络的输入阻抗。

解:





(b) ω=0.5rad/s

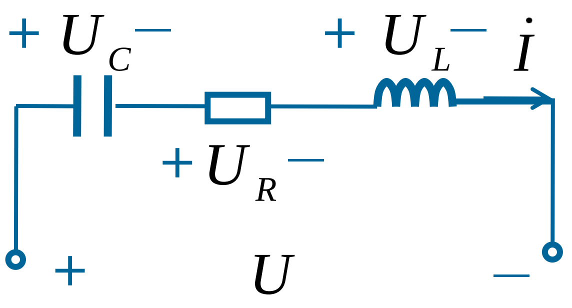
$$\dot{U}' = j\dot{I}' - j\dot{U} + \dot{U}$$

$$\dot{U} = \dot{I}'(2 // j2)$$

$$\therefore \dot{U}' = j\dot{I}' + \frac{j4}{2+j2}(1-j)\dot{I}' = (2+j1)\dot{I}'$$

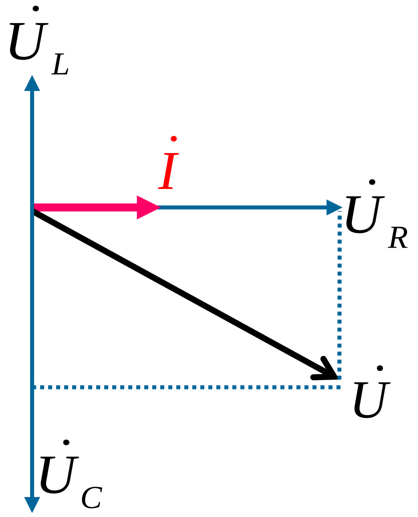
$$\therefore Z_i = (2+j1)\Omega$$

8-16 在题图7-16所示电路中，已知 $U_C = 15V, U_L = 12V$，$U_R = 4V$，求电压U为多少？

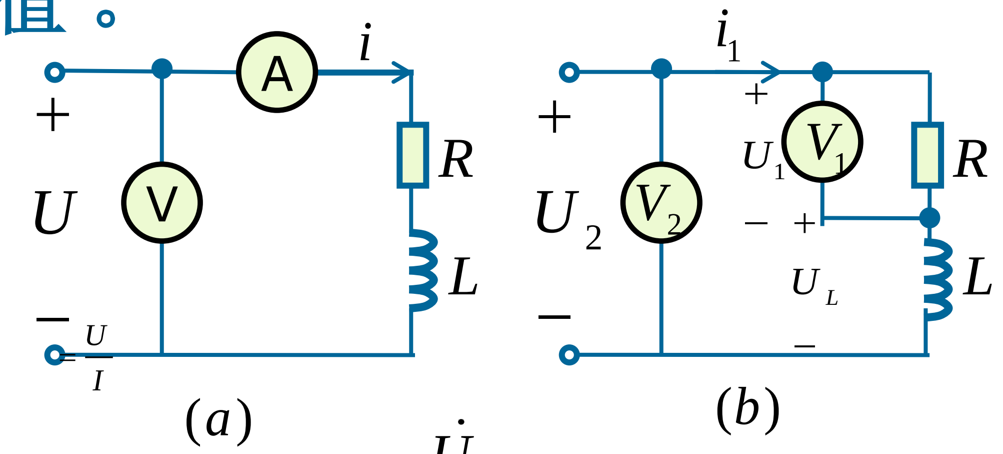


解： $U = \sqrt{U_R^2 + (U_L - U_C)^2}$

$= \sqrt{4^2 + (12-15)^2} = 5V$



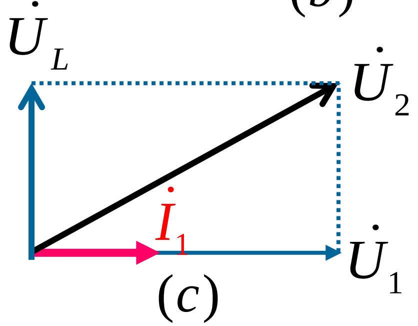
8-18 RL串联电路，在题图7-18(a)直流情况下，电流表的读数为50mA，电压表的读数为6V。在 $f=10^3 Hz$ 交流情况下，电压表 V_1 读数为6V，V_2 读数为10V，如图(b)所示。试求R、L的值 。



解：直流时电感相当于短路，则：

$$R=\frac{U}{I}=\frac{6}{50\times10^{-3}}=120\Omega$$

交流时相量图如图(c)，则：

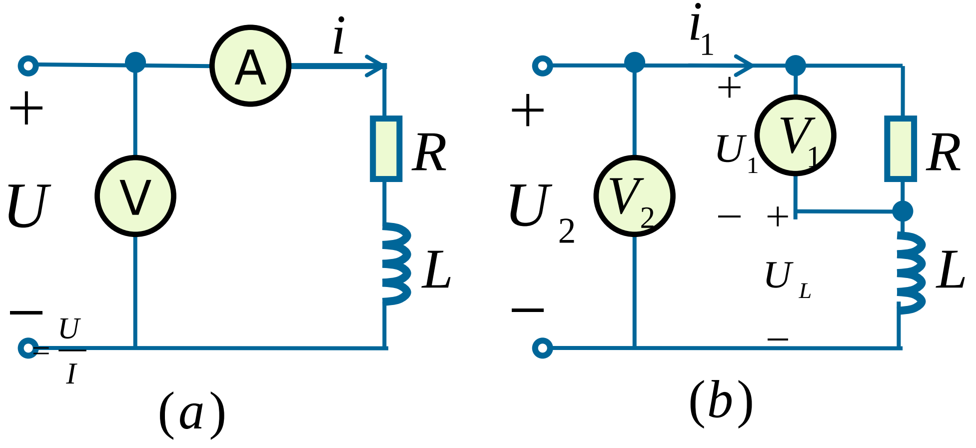


$$U_L=\sqrt{U_2^2-U_1^2}=8V$$

$$\because \frac{U_1}{R}=\frac{U_L}{\omega L} \qquad \therefore L=\frac{U_L R}{\omega U_1}=\frac{8\times120}{2\pi\times10^3\times6}=25.5mH$$

另解：直流时电感相当于短路，则：

$$R=\frac{U}{I}=\frac{6}{50\times10^{-3}}=120\Omega$$

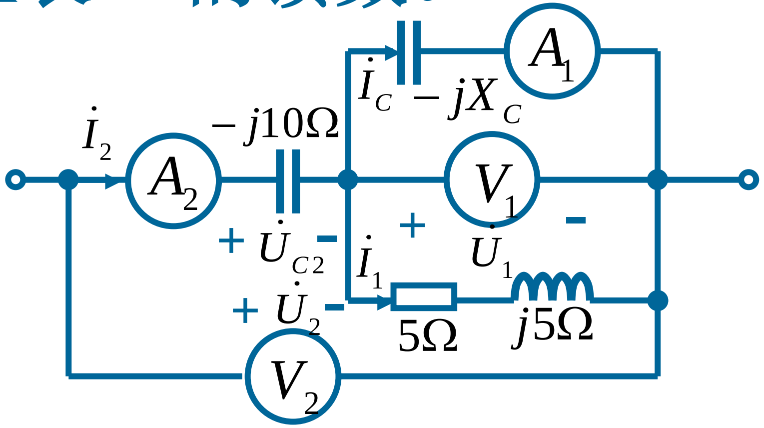


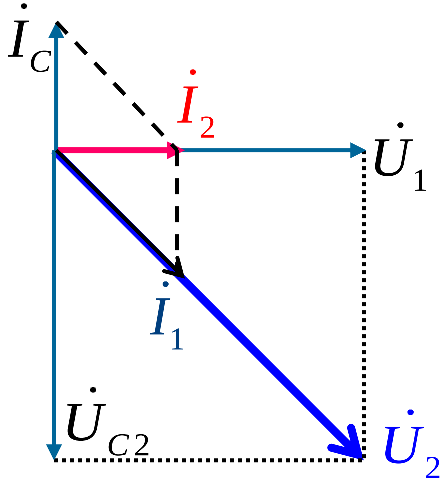
交流时设 $\dot{U}_1=6\angle0°V$，则：$\dot{I}_1=\frac{\dot{U}_1}{R}=\frac{6\angle0°}{120}=0.05\angle0°A$

$$\because Z=R+j\omega L \qquad \therefore |Z|=\sqrt{R^2+(\omega L)^2}=\frac{U_2}{I_1}=200$$

$$\therefore L=\frac{\sqrt{200^2-R^2}}{\omega}=25.5mH$$

8-19 题图7-19所示电路，已知电流表A1的读数为10A，电压表V1的读数为100V；试画相量图求电流表A2和电压表V2的读数。





解：设各电压、电流如图，且设$\dot{U}_1$为参考向量，则：

$$\dot{U}_1 = 100\angle 0^\circ \qquad \therefore \dot{I}_C = \frac{\dot{U}_1}{-jX_C} = \frac{U_1\angle 0^\circ}{X_C\angle -90^\circ} = 10\angle 90^\circ A$$

$$\dot{I}_1 = \frac{\dot{U}_1}{5+j5} = \frac{100\angle 0^\circ}{5\sqrt{2}\angle 45^\circ} = 10\sqrt{2}\angle -45^\circ A$$

故由相量图可得：$\therefore \dot{I}_2 = \dot{I}_1 + \dot{I}_C = 10\angle 0^\circ A$ 由相量图：

$$\dot{U}_{C2} = (-j10)\dot{I}_2 = 100\angle -90^\circ V \qquad \dot{U}_2 = \dot{U}_{C2} + \dot{U}_1 = 100\sqrt{2}\angle -45^\circ$$

8-22(b) 试分别列写下列电路的网孔方程和节点方程，各图中 $u_S = 10\cos 2tV$，$i_S = 0.5\cos(2t - 30^\circ)A$。

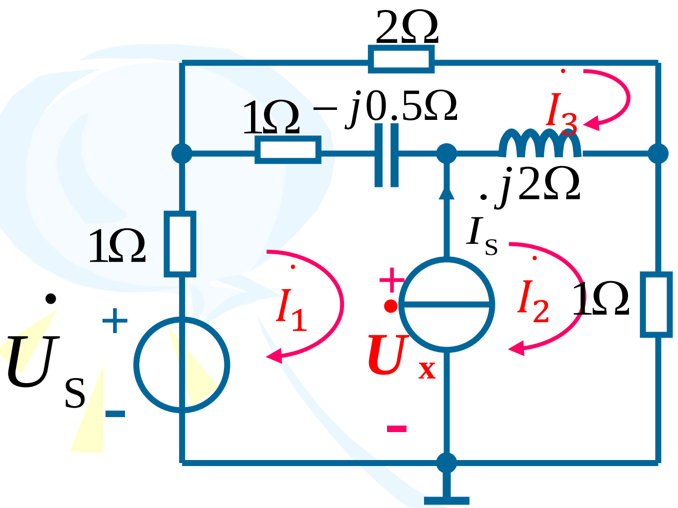
振幅相量和有效值相量都有，推荐有效值相量做！

解：(1)列网孔方程：

有效值相量：

$$\dot{I}_S = \frac{0.5\angle -30^\circ}{\sqrt{2}}\text{A}$$

$$\dot{U}_S = \frac{10\angle 0^\circ}{\sqrt{2}}\text{V}$$



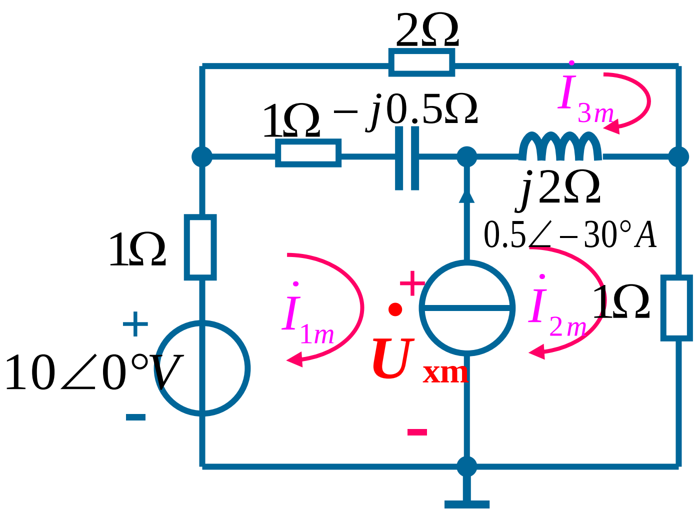
$$(2 - j0.5)\dot{I}_1 - (2 - j0.5)\dot{I}_3 = \frac{10\angle 0^\circ}{\sqrt{2}} - \dot{U}_x$$

$$(1 + j2)\dot{I}_2 - j2\dot{I}_3 = \dot{U}_x$$

$$-(1 - j0.5)\dot{I}_1 - j2\dot{I}_2 + (3 + j1.5)\dot{I}_3 = 0$$

$$\dot{I}_2 - \dot{I}_1 = \frac{0.5\angle -30^\circ}{\sqrt{2}}$$

振幅相量:

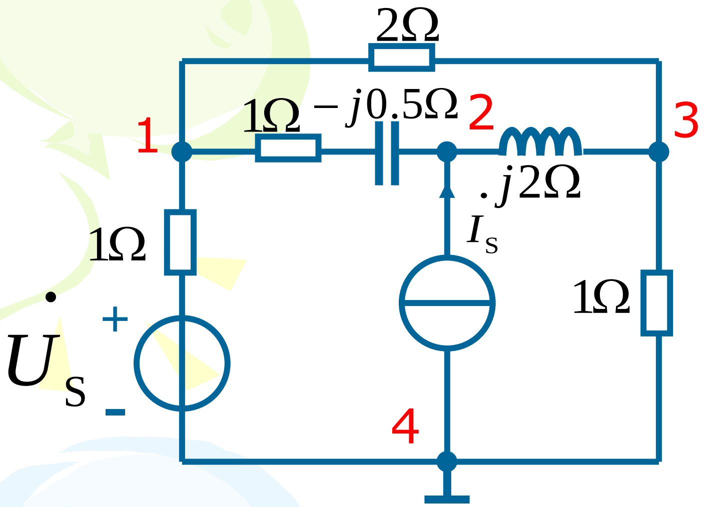


$$\dot{I}_{Sm} = 0.5\angle -30°\text{A}$$

$$\dot{U}_{Sm} = 10\angle 0°\text{V}$$

$$\begin{cases} (2-j0.5)\dot{I}_{1m} - (2-j0.5)\dot{I}_{3m} = 10\angle 0° - \dot{U}_{xm} \\ (1+j2)\dot{I}_{2m} - j2\dot{I}_{3m} = \dot{U}_{xm} \\ -(1-j0.5)\dot{I}_{1m} - j2\dot{I}_{2m} + (3+j1.5)\dot{I}_{3m} = 0 \\ \dot{I}_{2m} - \dot{I}_{1m} = 0.5\angle -30° \end{cases}$$

(2)列节点方程：



有效值相量：

$$\dot{I}_S = \frac{0.5\angle -30^\circ}{\sqrt{2}} \text{A}$$

$$\dot{U}_S = \frac{10\angle 0^\circ}{\sqrt{2}} \text{V}$$

$$(1+\frac{1}{2}+\frac{1}{1-0.5j})\dot{U}_1 - \frac{1}{1-0.5j}\dot{U}_2 - \frac{1}{2}\dot{U}_3 = \frac{10\angle 0^\circ}{\sqrt{2}}$$

$$-\frac{1}{1-0.5j}\dot{U}_1 + (\frac{1}{2j}+\frac{1}{1-0.5j})\dot{U}_2 - \frac{1}{2j}\dot{U}_3 = \frac{0.5\angle -30^\circ}{\sqrt{2}}$$

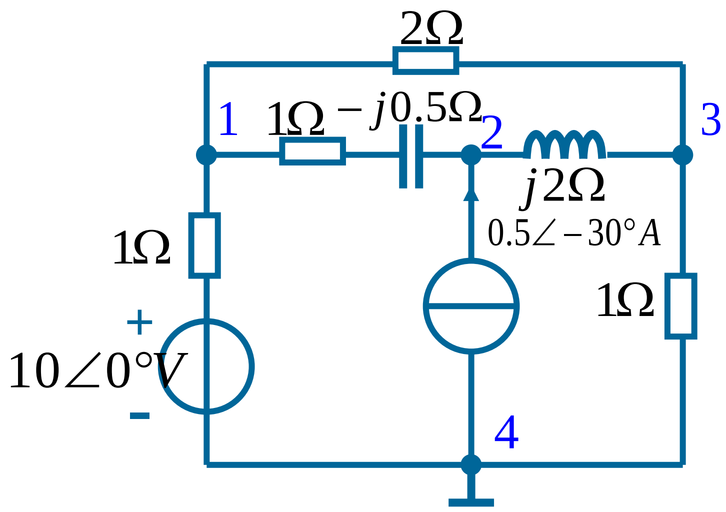
$$-\frac{1}{2}\dot{U}_1 - \frac{1}{2j}\dot{U}_2 + (\frac{1}{2}+1+\frac{1}{2j})\dot{U}_3 = 0$$

注：**1-0.5j**是一条支路，作为一个整体，是一个阻抗

振幅相量：

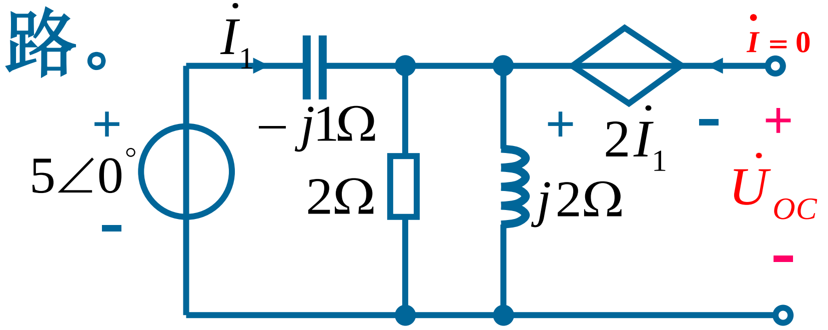
$$\dot{I}_{Sm} = 0.5\angle -30°\text{A}$$

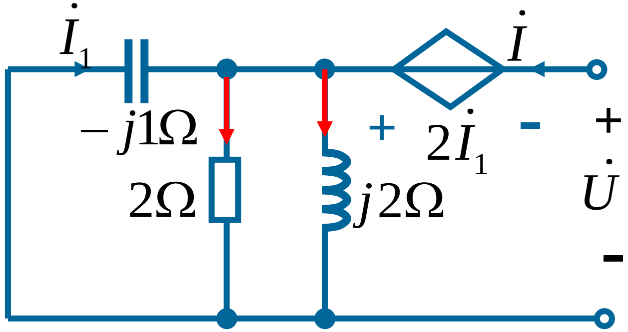
$$\dot{U}_{Sm} = 10\angle 0°\text{V}$$



$$\begin{cases} \left(1+\frac{1}{2}+\frac{1}{1-0.5j}\right)\dot{U}_{1m} - \frac{1}{1-0.5j}\dot{U}_{2m} - \frac{1}{2}\dot{U}_{3m} = \frac{10\angle 0°}{1} \\ -\frac{1}{1-0.5j}\dot{U}_{1m} + \left(\frac{1}{2j}+\frac{1}{1-0.5j}\right)\dot{U}_{2m} - \frac{1}{2j}\dot{U}_{3m} = 0.5\angle -30° \\ -\frac{1}{2}\dot{U}_{1m} - \frac{1}{2j}\dot{U}_{2m} + \left(\frac{3}{2}+\frac{1}{2j}\right)\dot{U}_{3m} = 0 \end{cases}$$

8-23(b) 试求题图7-23所示有源二端网络的戴维南等效电路。





解：(1)求开路电压 $\dot{U}_{OC}$：

$$\begin{cases} \dot{U}_{OC} = -2\dot{I}_1 - (-j1)\dot{I}_1 + 5\angle 0^\circ \\ \dot{I}_1 = \dfrac{5\angle 0^\circ}{-j1 + (2 // j2)} = 5\angle 0^\circ \end{cases}$$

$$\therefore \dot{U}_{OC} = -5 + j5 = 5\sqrt{2}\angle 135^\circ$$

(2) 求等效阻抗 Z_0：

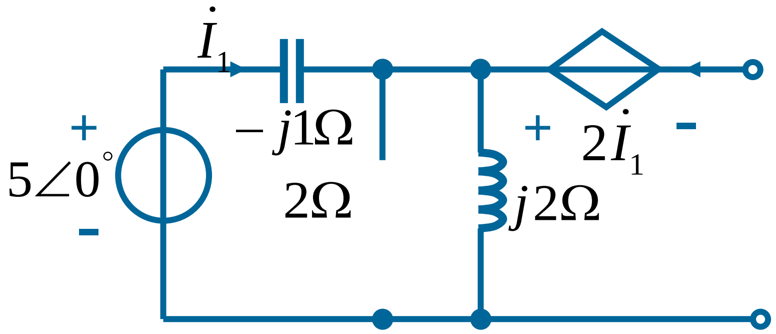
$$\begin{cases} \dot{U} = -2\dot{I}_1 - (-j\dot{I}_1) \\ \dot{I} = -\dot{I}_1 + \dfrac{(-j1)(-\dot{I}_1)}{2} + \dfrac{(-j1)(-\dot{I}_1)}{j2} \end{cases}$$

或：

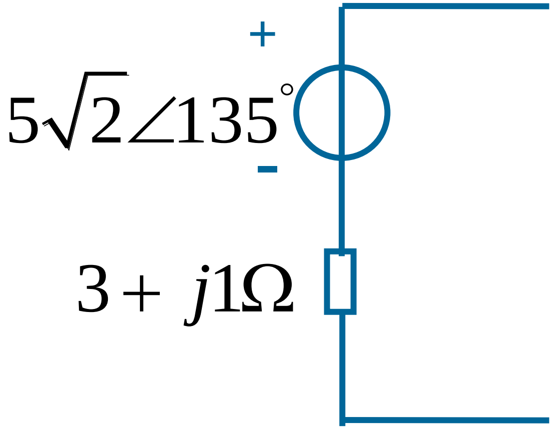
$$\begin{cases} \dot{U} = -2\dot{I}_1 - (-j\dot{I}_1) \\ \dot{I}_1 = -\dfrac{\dfrac{1}{-j1}}{\dfrac{1}{-j1} + \dfrac{1}{2} + \dfrac{1}{j2}}\dot{I} \text{（分流公式）} \end{cases}$$

可得： $\dot{U} = (3 + j1)\dot{I}$

$$\therefore Z_0 = (3 + j1)\Omega$$



戴维南等效电路图：



说明：若给的图是时域的，则等效戴维南电路图也必须是时域的，即：要将$Z_0=(3+j1)$转换成一电阻串联电感。

8-25 (2)已知关联参考方向下的无源二端网络的端口电压*u(t)*和电流*i(t)*分别为 $u(t)=10\cos(100t+70°)\text{V}$ **和** $i(t)=2\cos(100t+40°)A$**，试求各种情况下的P、Q和S。**

解：先将各量写成相量形式：

$$\dot{U}=5\sqrt{2}\angle 70^{\circ}\text{V},\quad \dot{I}=\sqrt{2}\angle 40^{\circ}A$$

$$P=UI\cos\theta_z=5\sqrt{2}\times\sqrt{2}\cos 30^{\circ}=5\sqrt{3}W$$

$$Q=UI\sin\theta_z=5\sqrt{2}\times\sqrt{2}\sin 30^{\circ}=5Var$$

$$S=UI=10VA$$

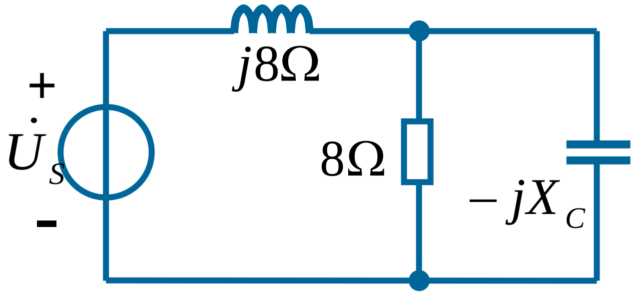
另解：

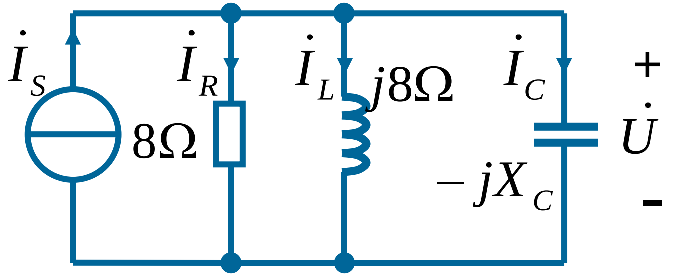
$$\tilde{S}=\dot{U}\overset{*}{\dot{I}}=5\sqrt{2}\angle 70^{\circ}\times\sqrt{2}\angle -40^{\circ}$$

$$=10\angle 30^{\circ}=5\sqrt{3}+j5$$

$$\therefore P=5\sqrt{3}W,\quad Q=5Var,\quad S=10VA$$

8-27 二端网络如题图7-27所示，已知$\dot{U}_S = 50\angle 0^\circ V$，电源提供的平均功率为312.5W，试求$X_C$的数值。





解：将电路等效为诺顿模型，并设各支路电流和电压如相量模型图所示，其中：

$$\dot{I}_S = \frac{\dot{U}_S}{j8} = 6.25\angle -90^\circ A$$

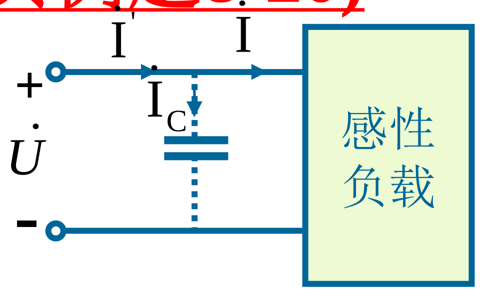
$$P = I_R^2 R = 312.5 \Rightarrow I_R = 6.25A$$

$$\because \dot{I}_S = \dot{I}_R + \dot{I}_C + \dot{I}_L \quad \text{即} \quad I_S = \sqrt{(I_C - I_L)^2 + I_R^2} \quad \text{且} \because I_R = I_S$$

$$\therefore I_C = I_L \quad \text{而} I_C = \frac{U}{X_C}, I_L = \frac{U}{8} \qquad \therefore X_C = 8\Omega$$

8-28 如题图7-28所示，已知某感性负载接于电压220V、频率50Hz的交流电源上，其吸收的平均功率为40W，端口电流I=0.66A，试求感性负载的功率因数；如欲使电路的功率因数提高到0.9，问至少需并联多大电容C？

(213页例题8-20)



解：$\because P = UI\cos\theta_Z$

故：$p_f = \cos\theta_Z = \dfrac{P}{UI} = \dfrac{40}{220\times 0.66} \approx 0.275$

且 $\theta_Z = 74^\circ$

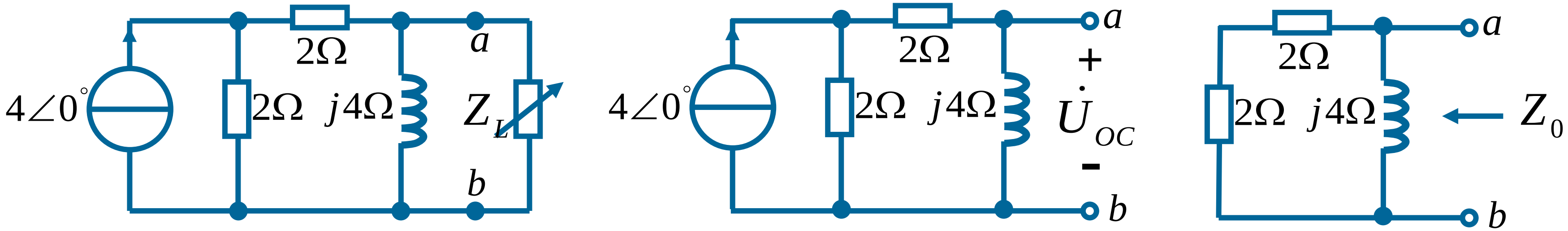
当 $p_f' = \cos\theta_Z' = 0.9$, $I' = \dfrac{P}{U\cdot p_f'} = \dfrac{40}{220\times 0.9} \approx 0.202A$

且 $\theta_Z = 25.8^\circ$ 设 $\dot{U} = 220\angle 0^\circ$

$\therefore \dot{I}_C = \dot{I}' - \dot{I} = 0.202\angle{-25.8^\circ} - 0.66\angle{-74^\circ} \approx j0.55A$

$\because I_C = \omega CU \Rightarrow C = \dfrac{I_C}{2\pi fU} = \dfrac{0.55}{2\times 3.14\times 50\times 220} \approx 7.9\mu f$

8-29 正弦稳态电路如题图7-29所示，若Z_L可变，试问为何值时可获得最大功率？最大功率P_{max}为多少？



解：1）求开路电压 $\dot{U}_{OC}$ ：

$$\dot{U}_{OC}=4\angle 0^{\circ}\times\frac{2}{2+2+j4}\times j4=\frac{8\angle 90^{\circ}}{\sqrt{2}\angle 45^{\circ}}=4\sqrt{2}\angle 45^{\circ}V$$

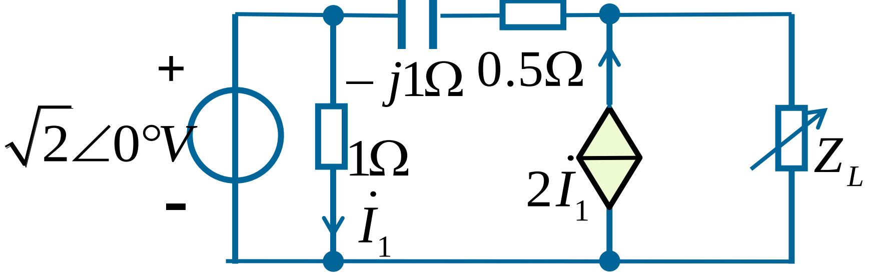
2）求等效阻抗Z_0：

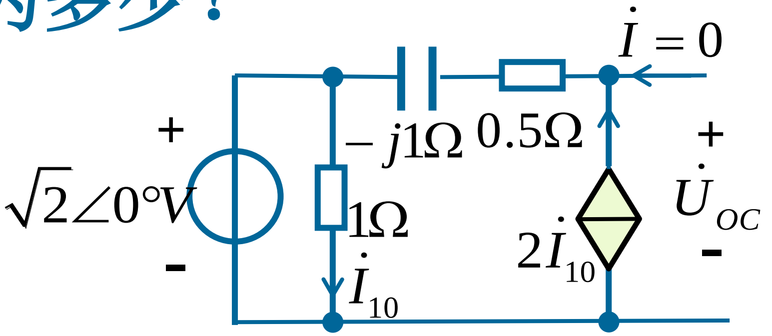
$$Z_0=(2+2)//j4=\frac{4\angle 90^{\circ}}{\sqrt{2}\angle 45^{\circ}}=2+j2\Omega$$

3）当$Z_L=\overset{*}{Z_0}=2-j2\Omega$时，最大功率为：

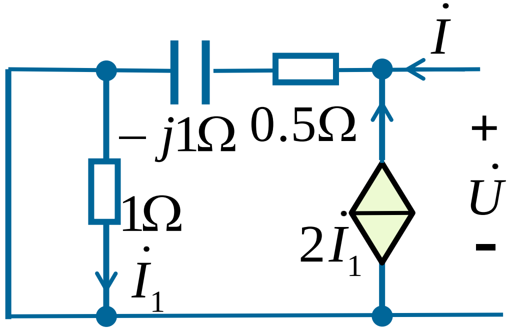
$$P_{max}=\frac{U_{OC}^2}{4R_0}=\frac{(4\sqrt{2})^2}{4\times 2}=4W$$

8-30 电路如题图7-30所示，试求负载 Z_L为何值时可获得最大功率？最大功率 P_{max} 为多少？





解： $\dot{U}_{OC} = 2\dot{I}_{10}(0.5 - j1) + \sqrt{2}\angle 0°$



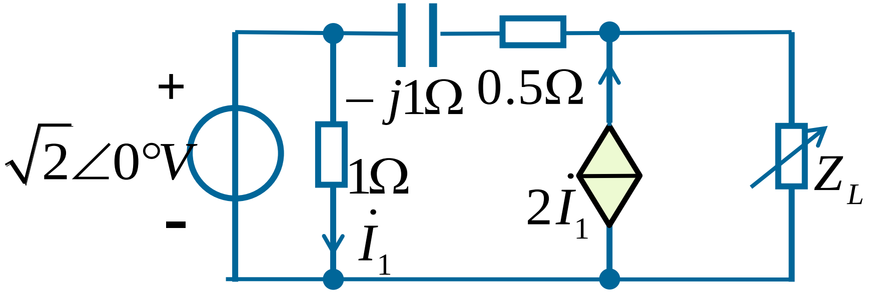
$$\dot{I}_{10} = \frac{\sqrt{2}\angle 0°}{1} = \sqrt{2}\angle 0° A$$

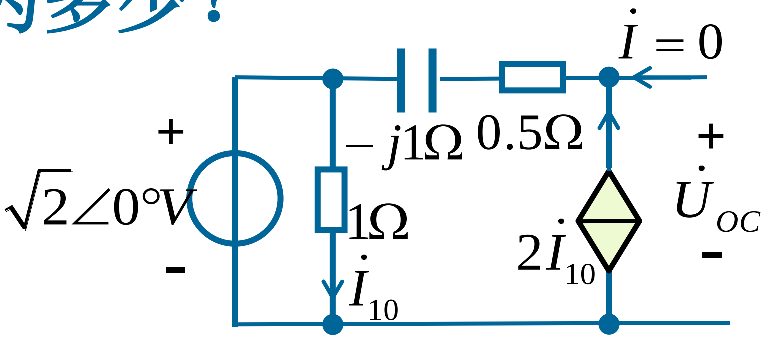
$$\therefore \dot{U}_{OC} = 2\sqrt{2} - j2\sqrt{2} = 4\angle -45° V$$

$$\dot{I}_1 = 0A \Rightarrow 2\dot{I}_1 = 0 \qquad \therefore Z_0 = 0.5 - j1\Omega$$

当$Z_L = \overset{*}{Z}_0 = 0.5 + j1\Omega$时，可获得最大功率： $P_{max} = \dfrac{U_{oc}^2}{4R_0} = 8W$

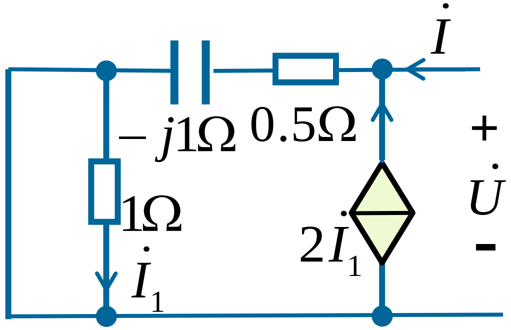
8-30 电路如题图7-30所示，试求负载 Z_L 为何值时可获得最大功率？最大功率 P_{max} 为多少？





解： $\dot{U}_{OC}=2\dot{I}_{10}(0.5-j1)+\sqrt{2}\angle 0°$

$$\dot{I}_{10}=\frac{\sqrt{2}\angle 0°}{1}=\sqrt{2}\angle 0°A$$



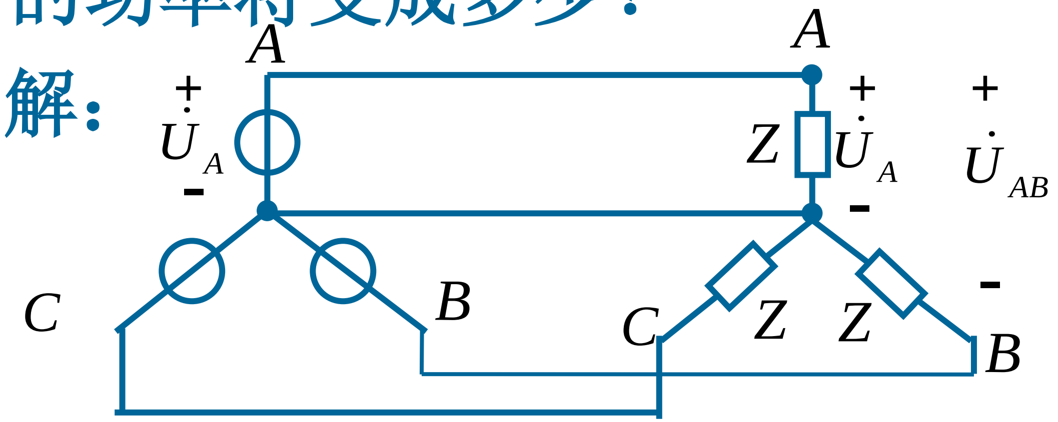
$$\therefore \dot{U}_{OC}=2\sqrt{2}-j2\sqrt{2}=4\angle -45°V$$

$$\dot{I}_1=0A \Rightarrow 2\dot{I}_1=0 \qquad \therefore Z_0=0.5-j1\Omega$$

当$Z_L=\overset{*}{Z}_0=0.5+j1\Omega$时，可获得最大功率： $P_{max}=\dfrac{U_{oc}^2}{4R_0}=8W$

8-31 已知三相电路中星形连接的三相负载每相阻抗 $Z=12+j16\Omega$，接至对称三相电源，其线电压为380V。若端线阻抗忽略不计，试求线电流及负载吸收的功率；若将此三相负载改为三角形连接，线电流及负载吸收的功率将变成多少？

解：



$$\dot{U}_{AB}=380\angle 0°V$$

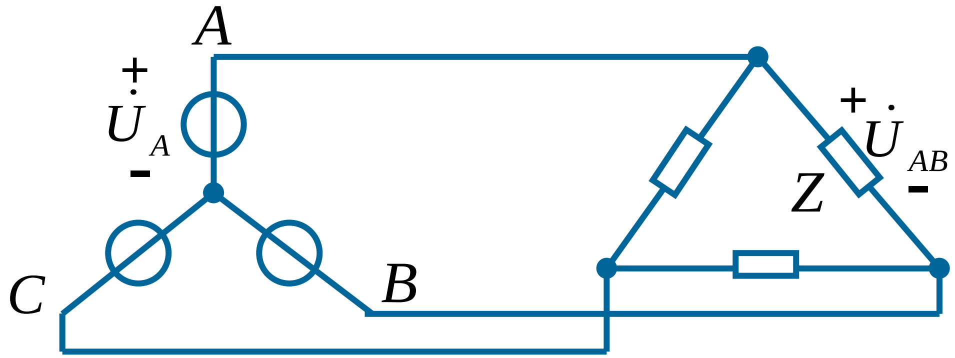
$$\dot{U}_A=\frac{1}{\sqrt{3}}\dot{U}_{AB}\angle -30°$$

$$=220\angle -30°V$$

$$\dot{I}_A=\frac{\dot{U}_A}{Z}=\frac{220\angle -30°}{12+j16}=\frac{220\angle -30°}{20\angle 53.1°}=11\angle -83.1°A$$

$$\therefore I_l=I_P=11A$$

$$P=3U_PI_P\cos\theta_Z=3\times 220\times 11\times\cos 53.1°=4356W$$



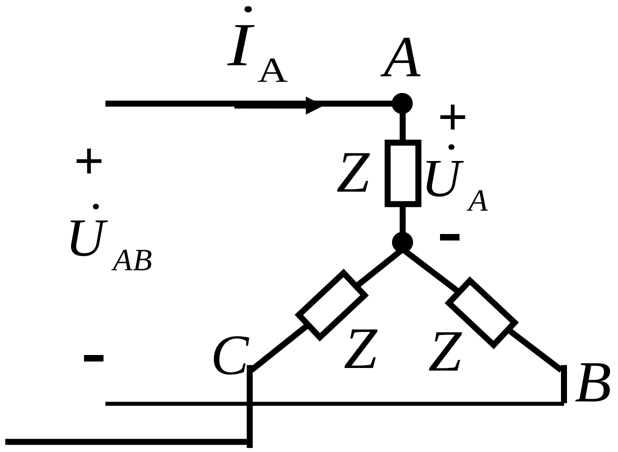
$$\dot{U}_{AB} = 380\angle 0° V$$

$$\dot{I}_{AB} = \frac{\dot{U}_{AB}}{Z} = \frac{380\angle 0°}{12 + j16} = \frac{380\angle 0°}{20\angle 53.1°} = 19\angle -53.1° A$$

$$I_P = 19A = \frac{1}{\sqrt{3}} I_l \Rightarrow I_l = 32.9A$$

$$P = 3U_P I_P \cos\theta_Z = 3\times 380\times 19\times \cos 53.1° = 12996W$$

8-32



由题意可知 $\dot{U}_{AB}=380\angle 60°\text{V}$

星形连接A相负载相电压 $\dot{U}_A=\frac{1}{\sqrt{3}}\dot{U}_{AB}\angle -30° = 220\angle 30°\text{V}$

A相负载相电流 $\dot{I}_A=\frac{\dot{U}_A}{Z}=\frac{220\angle 30°}{3+4j}=44\angle\text{-}23.1°\text{A}$

根据对称三相电路对称性

$$\dot{I}_B=44\angle -23.1°-120° = 44\angle -143.1° A$$

$$\dot{I}_c=44\angle -23.1°+120° = 44\angle 96.9.1° A$$

$$P=3U_pI_p\cos\theta_Z = 3\times 220\times 44\times \cos 53.1° = 17424\text{W}$$

$$i_A(t)=44\sqrt{2}\cos(314t\text{-}23.1°)\text{A}$$

$$i_B(t)=44\sqrt{2}\cos(314t\text{-}143.1°)\text{A}$$

$$i_C(t)=44\sqrt{2}\cos(314t+96.9°)\text{A}$$

8-41 题图7-41所示二端网络N的端口电流、电压分别为

$$i(t) = 5\cos t + 2\cos(2t + \frac{\pi}{4})A,$$

$$u(t) = 3 + \cos(t + \frac{\pi}{2}) + \cos(2t - \frac{\pi}{4}) + \cos(3t - \frac{\pi}{3})V$$

试求网络吸收的平均功率。

解：

$$P = \sum_{k=0}^{3} U_k I_k \cos\theta_{Zk}$$

$$= U_0 I_0 + U_1 I_1 \cos\frac{\pi}{2} + U_2 I_2 \cos(-\frac{\pi}{2})$$

$$= 3\times 0 + \frac{1}{\sqrt{2}} \cdot \frac{5\sqrt{2}}{2} \cos\frac{\pi}{2} + \frac{1}{\sqrt{2}} \cdot \sqrt{2}\cos(-\frac{\pi}{2}) = 0$$

8-42 已知流过2Ω 电阻的电流

$$i(t) = 2 + 2\sqrt{2}\cos t + \sqrt{2}\cos(2t + 30°)A,$$

试求电阻消耗的平均功率。

解：

$$P = \sum_{k=0}^{2} I_k^2 R$$

$$= (I_0^2 + I_1^2 + I_2^2)R = (2^2 + 2^2 + 1^2) \times 2 = 18W$$