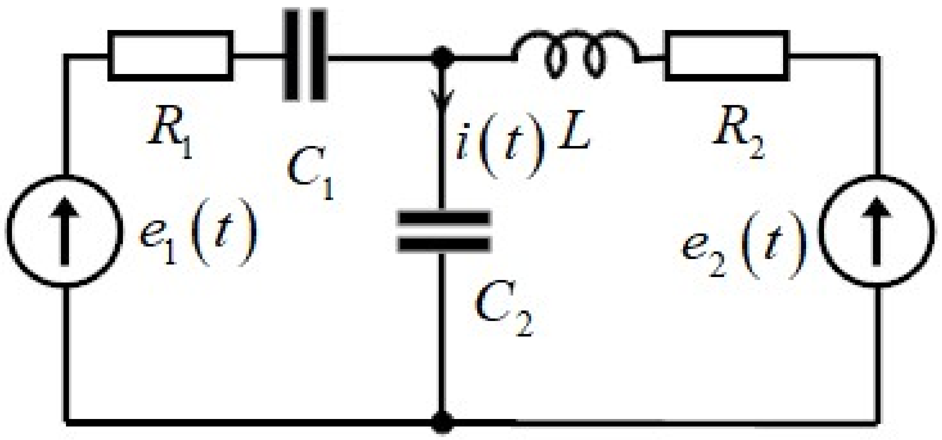
Zad 1 MPO

W obwodzie panuje stan ustalony. Wyznaczyć prąd $i(t)$.



$e_1(t) = 2\sin(2t + \frac{3\pi}{4})$ V,

$e_2(t) = 2\sin(2t - \frac{\pi}{4})$ V,

$R_1 = 1\Omega$, $R_2 = 1\Omega$,

$L = \frac{1}{2}$H, $C_1 = C_2 = \frac{1}{2}$F.

$$\underline{E}_1 = -1 + \mathrm{j}; \qquad \underline{E}_2 = 1 - \mathrm{j}; \qquad \omega_0 = 2$$

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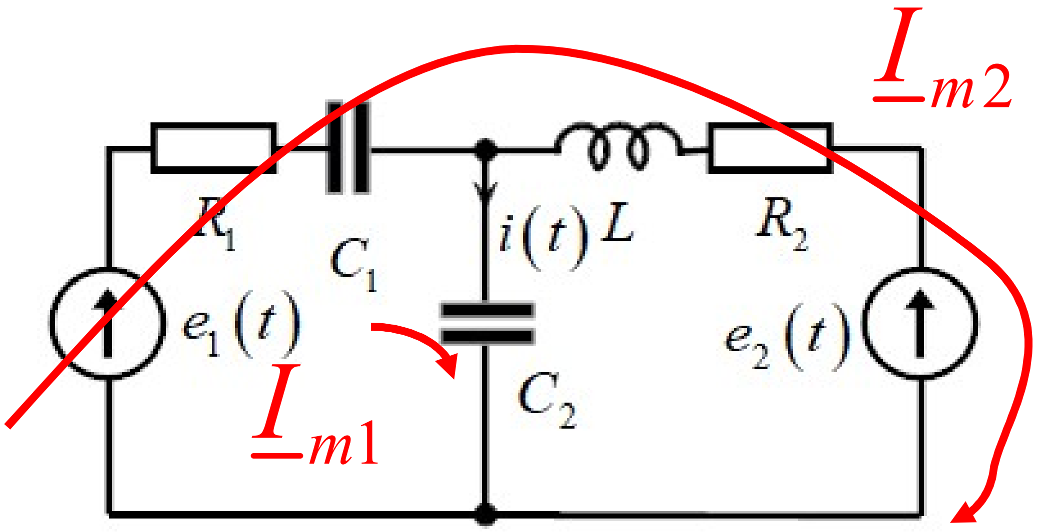

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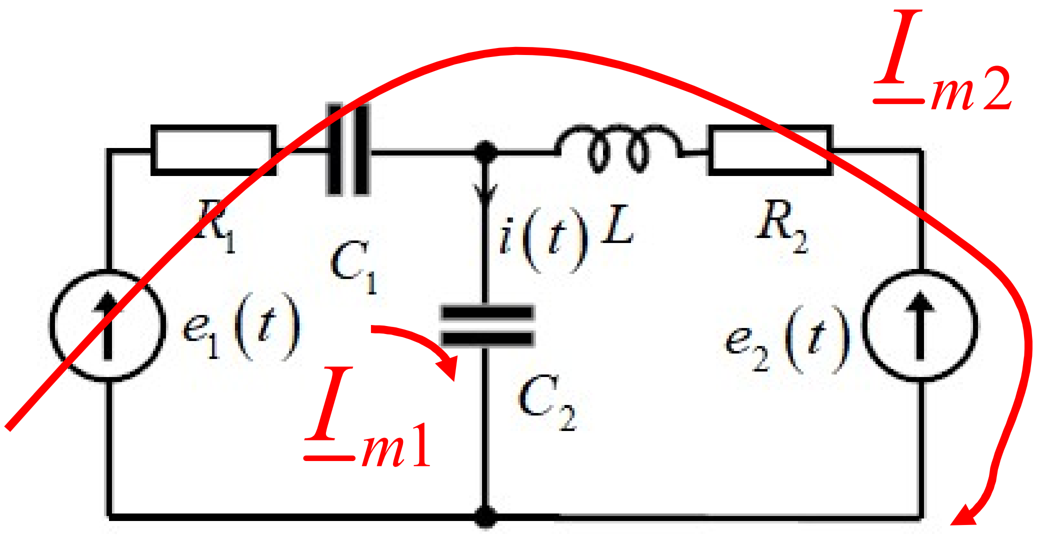

$$e_1(t) = 2\sin(2t + \frac{3\pi}{4})\ \text{V},$$

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$$R_1 = 1\Omega, \quad R_2 = 1\Omega,$$

$$L = \frac{1}{2}\text{H}, \quad C_1 = C_2 = \frac{1}{2}\text{F}.$$

$$\begin{bmatrix} R_1 + \dfrac{1}{\mathrm{j}\omega_0 C_1} + \dfrac{1}{\mathrm{j}\omega_0 C_2} & R_1 + \dfrac{1}{\mathrm{j}\omega_0 C_1} \\ R_1 + \dfrac{1}{\mathrm{j}\omega_0 C_1} & R_1 + R_2 + \dfrac{1}{\mathrm{j}\omega_0 C_1} + \mathrm{j}\omega_0 L \end{bmatrix} \begin{bmatrix} \underline{I}_{m1} \\ \underline{I}_{m2} \end{bmatrix} = \begin{bmatrix} \underline{E}_1 \\ \underline{E}_1 - \underline{E}_2 \end{bmatrix}$$

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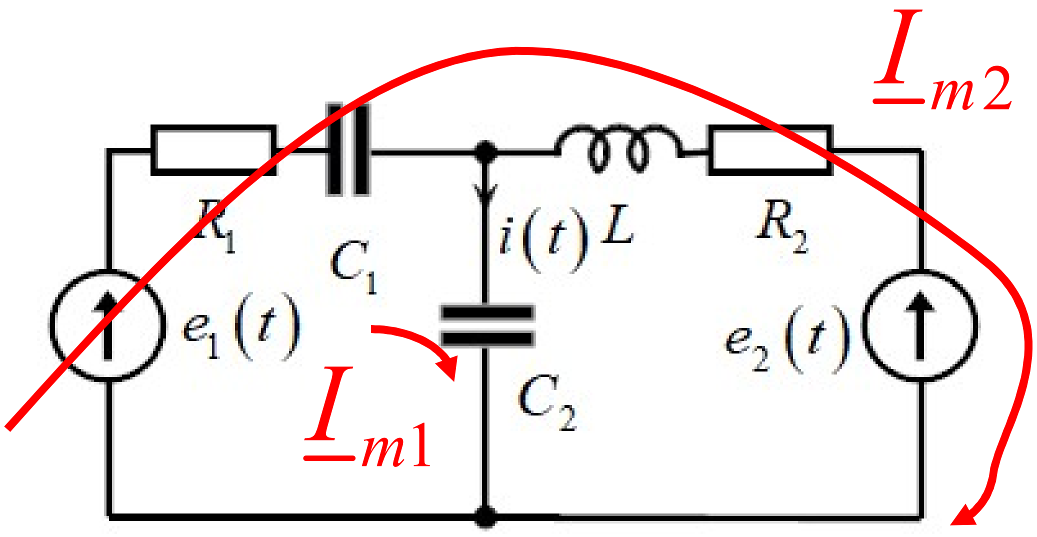

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$$\begin{bmatrix} 1-2\text{j} & 1-\text{j} \\ 1-\text{j} & 2 \end{bmatrix} \begin{bmatrix} \underline{I}_{m1} \\ \underline{I}_{m2} \end{bmatrix} = \begin{bmatrix} -1+\text{j} \\ -2+2\text{j} \end{bmatrix}$$

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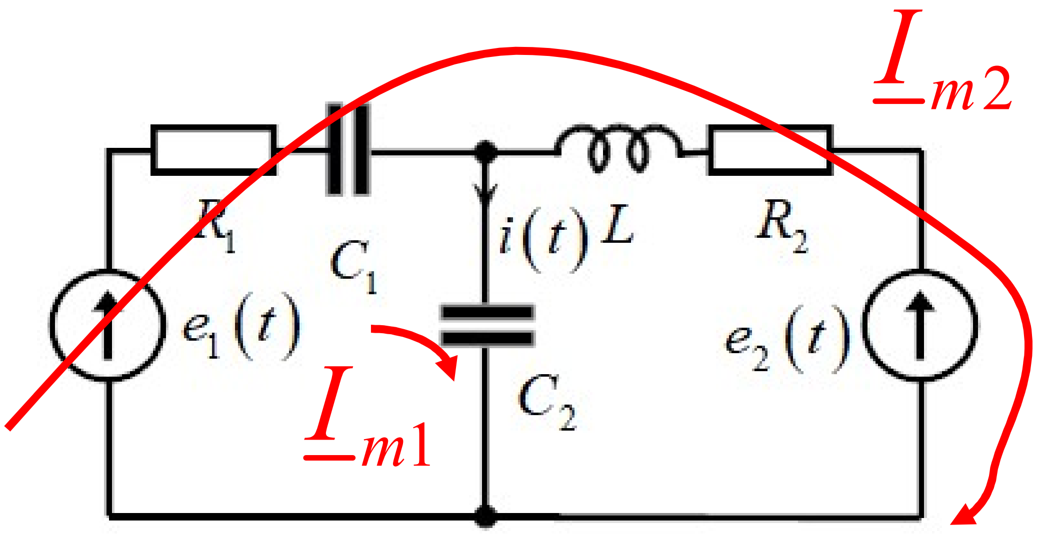

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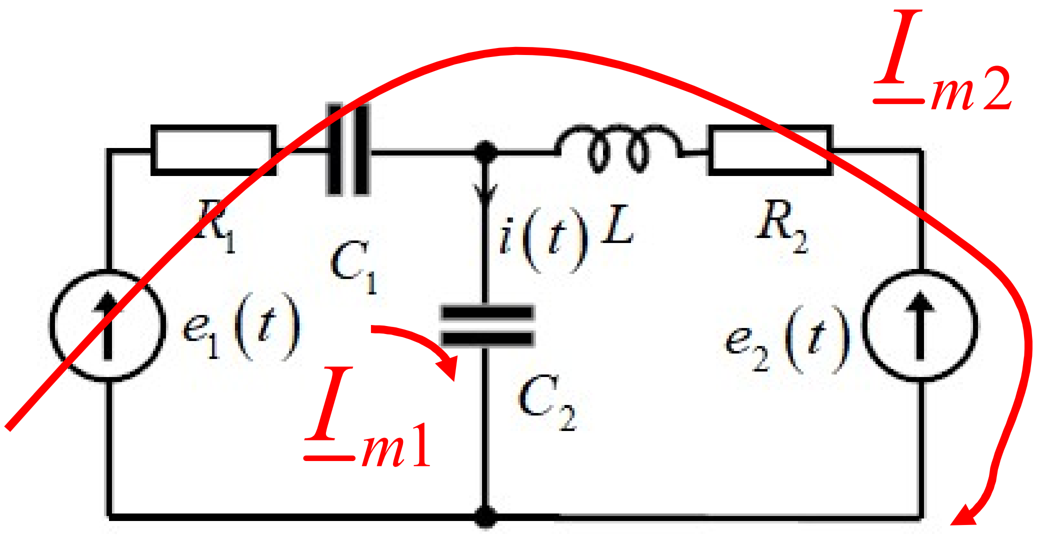
$$\begin{bmatrix} 1-2\mathrm{j} & 1-\mathrm{j} \\ 1-\mathrm{j} & 2 \end{bmatrix} \begin{bmatrix} \underline{I}_{m1} \\ \underline{I}_{m2} \end{bmatrix} = \begin{bmatrix} -1+\mathrm{j} \\ -2+2\mathrm{j} \end{bmatrix}$$

$$\Delta = \begin{vmatrix} 1-2\mathrm{j} & 1-\mathrm{j} \\ 1-\mathrm{j} & 2 \end{vmatrix} = 2-2\mathrm{j}$$

$$\underline{I}_{m1} = \frac{W}{\Delta} = \frac{-2-2\mathrm{j}}{2-2\mathrm{j}} = -\mathrm{j}$$

$$W = \begin{vmatrix} -1+\mathrm{j} & 1-\mathrm{j} \\ -2+2\mathrm{j} & 2 \end{vmatrix} = -2-2\mathrm{j}$$

W obwodzie panuje stan ustalony. Wyznaczyć prąd $i(t)$.



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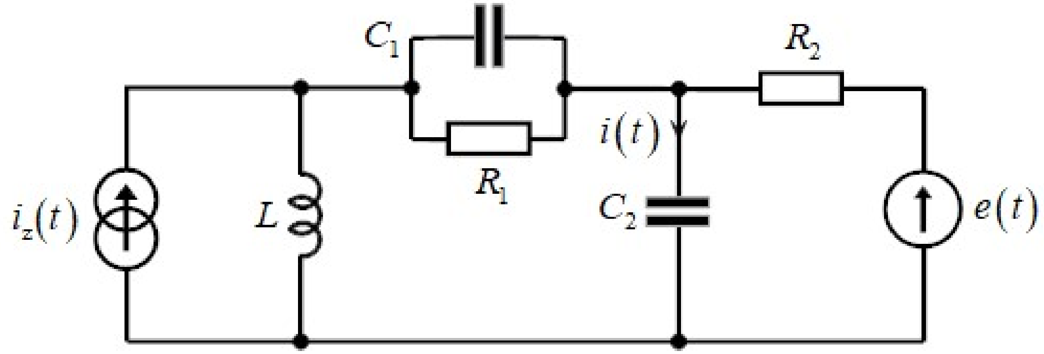
$$\underline{I}_{m1} = \frac{W}{\Delta} = \frac{-2-2\mathrm{j}}{2-2\mathrm{j}} = -\mathrm{j} = e^{-\mathrm{j}\frac{\pi}{2}} = e^{-\mathrm{j}90^0}$$

$$i(t) = \sqrt{2}\sin(2t - 90^0)\mathrm{A}$$

Zad 2 MNP

W obwodzie panuje stan ustalony. Wyznaczyć prąd $i(t)$.



$i_z(t) = 2\sin\left(t + \frac{\pi}{4}\right)$ A,

$e(t) = -\sqrt{2}\cos t$ V,

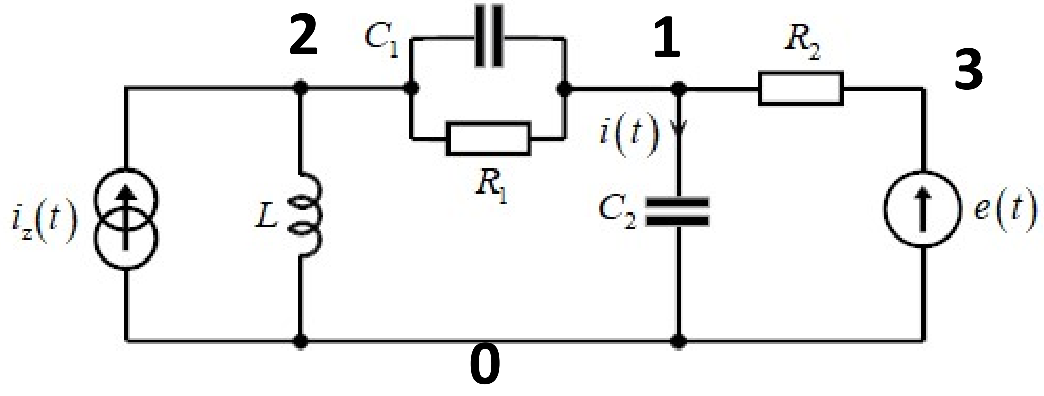
$R_1 = 2\Omega, \quad R_2 = 1\Omega,$

$L = 1\text{H}, \quad C_1 = \frac{1}{2}\text{F}, \quad C_2 = 2\text{F}.$

$$\underline{I}_Z = 1 + \mathrm{j}; \qquad \underline{E} = -\mathrm{j}; \qquad \omega_0 = 1$$

Zad 2 MNP

W obwodzie panuje stan ustalony. Wyznaczyć prąd $i(t)$.



$i_z(t) = 2\sin\left(t + \frac{\pi}{4}\right)$ A,

$e(t) = -\sqrt{2}\cos t$ V,

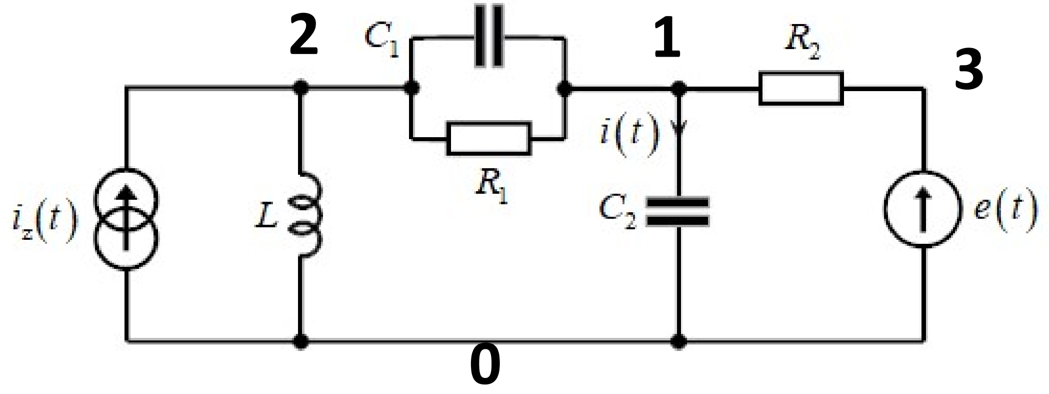
$R_1 = 2\Omega, \quad R_2 = 1\Omega,$

$L = 1\text{H}, \quad C_1 = \frac{1}{2}\text{F}, \quad C_2 = 2\text{F}.$

$$\begin{bmatrix} \frac{1}{R_1} + \frac{1}{R_2} + \mathrm{j}\omega_0 C_1 + \mathrm{j}\omega_0 C_2 & -\frac{1}{R_1} - \mathrm{j}\omega_0 C_1 \\ -\frac{1}{R_1} - \mathrm{j}\omega_0 C_1 & \frac{1}{R_1} + \mathrm{j}\omega_0 C_1 + \frac{1}{\mathrm{j}\omega_0 L} \end{bmatrix} \begin{bmatrix} \underline{U}_1 \\ \underline{U}_2 \end{bmatrix} = \begin{bmatrix} \frac{\underline{E}}{R_1} \\ \underline{I}_Z \end{bmatrix}$$

Zad 2 MNP

W obwodzie panuje stan ustalony. Wyznaczyć prąd $i(t)$.



$i_z(t) = 2\sin\left(t + \frac{\pi}{4}\right)\,\mathrm{A}$,

$e(t) = -\sqrt{2}\cos t\ \mathrm{V}$,

$R_1 = 2\Omega,\quad R_2 = 1\Omega$,

$L = 1\mathrm{H},\quad C_1 = \frac{1}{2}\mathrm{F},\quad C_2 = 2\mathrm{F}.$

$$\begin{bmatrix} \frac{3}{2} + \mathrm{j}\frac{5}{2} & -\left(\frac{1}{2} + \mathrm{j}\frac{1}{2}\right) \\ -\left(\frac{1}{2} + \mathrm{j}\frac{1}{2}\right) & \frac{1}{2} - \mathrm{j}\frac{1}{2} \end{bmatrix} \begin{bmatrix} \underline{U}_1 \\ \underline{U}_2 \end{bmatrix} = \begin{bmatrix} -\mathrm{j} \\ 1 + \mathrm{j} \end{bmatrix}$$

Zad 2 MNP

$$\begin{bmatrix} \frac{3}{2}+j\frac{5}{2} & -\left(\frac{1}{2}+j\frac{1}{2}\right) \\ -\left(\frac{1}{2}+j\frac{1}{2}\right) & \frac{1}{2}-j\frac{1}{2} \end{bmatrix}\begin{bmatrix} \underline{U}_1 \\ \underline{U}_2 \end{bmatrix}=\begin{bmatrix} 1+j \\ -j \end{bmatrix}$$

$$\Delta=\begin{vmatrix} \frac{3}{2}+j\frac{5}{2} & -\left(\frac{1}{2}+j\frac{1}{2}\right) \\ -\left(\frac{1}{2}+j\frac{1}{2}\right) & \frac{1}{2}-j\frac{1}{2} \end{vmatrix}=2$$

$$W=\begin{vmatrix} -j & -\left(\frac{1}{2}+j\frac{1}{2}\right) \\ 1+j & \frac{1}{2}-j\frac{1}{2} \end{vmatrix}=-\frac{1}{2}+j\frac{1}{2}$$

$$\underline{U}_1=\frac{W}{\Delta}=-\frac{1}{4}+j\frac{1}{4}=\frac{\sqrt{2}}{4}e^{j135^0}$$

Zad 2 MNP

$$\underline{U}_1 = \frac{W}{\Delta} = -\frac{1}{4} + \mathrm{j}\frac{1}{4} = \frac{\sqrt{2}}{4} e^{\mathrm{j}135^0}$$

$$\underline{I} = \underline{U}_1 \mathrm{j}\omega C_2 = \left(-\frac{1}{4} + \mathrm{j}\frac{1}{4}\right)\mathrm{j}2 = \frac{\sqrt{2}}{4} e^{\mathrm{j}135^0}\, 2e^{\mathrm{j}90^0} = \frac{\sqrt{2}}{2} e^{\mathrm{j}225^0} = \frac{\sqrt{2}}{2} e^{-\mathrm{j}135^0}$$

$$i(t) = \sin(t - 135^0)\,A$$