$\underline{U_L} = j \cdot X_L \cdot \underline{J}$

$\underline{U_C} = -j \cdot X_C \cdot \underline{J}$

$\underline{U_R} = R \cdot \underline{J}$

$X_L = \omega \cdot L \quad \frac{1}{j} = -j$

$X_C = \frac{1}{\omega C} \quad -\frac{1}{j} = j$

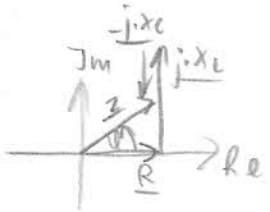
$\underline{U} = \underline{Z} \cdot \underline{J}$ prawo Ohma dla obwodu prądu przemiennego

$\underline{J} = \underline{U} \cdot \underline{Y}$ odwrotne prawo Ohma dla obwodu prądu przemiennego

$\underline{U} = U \cdot e^{j\varphi_u}$

$\underline{J} = J \cdot e^{j\varphi_J}$

$\underline{Z} = Z \cdot e^{j\varphi}$

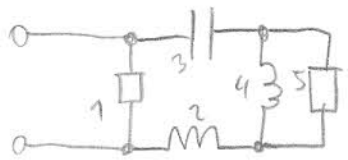


$\underline{Z}$ - impedancja

$\underline{Y}$ - admitancja $\underline{Y} = \frac{1}{\underline{Z}}$

$j^2 = -1$

Wyznaczyć wypadkową impedancję obwodu



$Z_k = 1 \quad (k = 1,2,3,4,5)$

$\underline{Z_1} = 1$
$\underline{Z_2} = j$
$\underline{Z_3} = -j$
$\underline{Z_4} = j$
$\underline{Z_5} = 1$

$\underline{Y_{45}} = \underline{Y_4} + \underline{Y_5} = \frac{1}{j} + \frac{1}{1} = -j + 1 = 1 - j$

$\underline{Z_{234}} = \underline{Z_2} + \underline{Z_3} + \frac{1}{\underline{Y_{45}}} = j - j + \frac{1}{(1-j)} = \frac{1(1+j)}{(1-j)\cdot(1+j)} = \frac{1+j}{1+j-j+1}$

$\underline{Z_{234}} = \frac{1+j}{2}$

$\underline{Y_{12345}} = \underline{Y_1} + \frac{1}{\underline{Z_{234}}} = 1 + \frac{2}{1+j} = 1 + \frac{2(1-j)}{(1+j)(1-j)} =$

$\underline{Y_{12345}} = 1 + \frac{2(1-j)}{(1-j+j+1)} = 1 + \frac{2(1-j)}{2} = 1 + 1 - j = 2 - j$

$\underline{Z_{12345}} = \frac{1}{\underline{Y_{12345}}} = \frac{1}{2-j} = \frac{2+j}{(2-j)(2+j)} = \frac{2+j}{(4+2j-2j+1)} = \frac{2+j}{5}$

$\underline{Z_{12345}} = \frac{1}{5} \cdot (2 + j)$