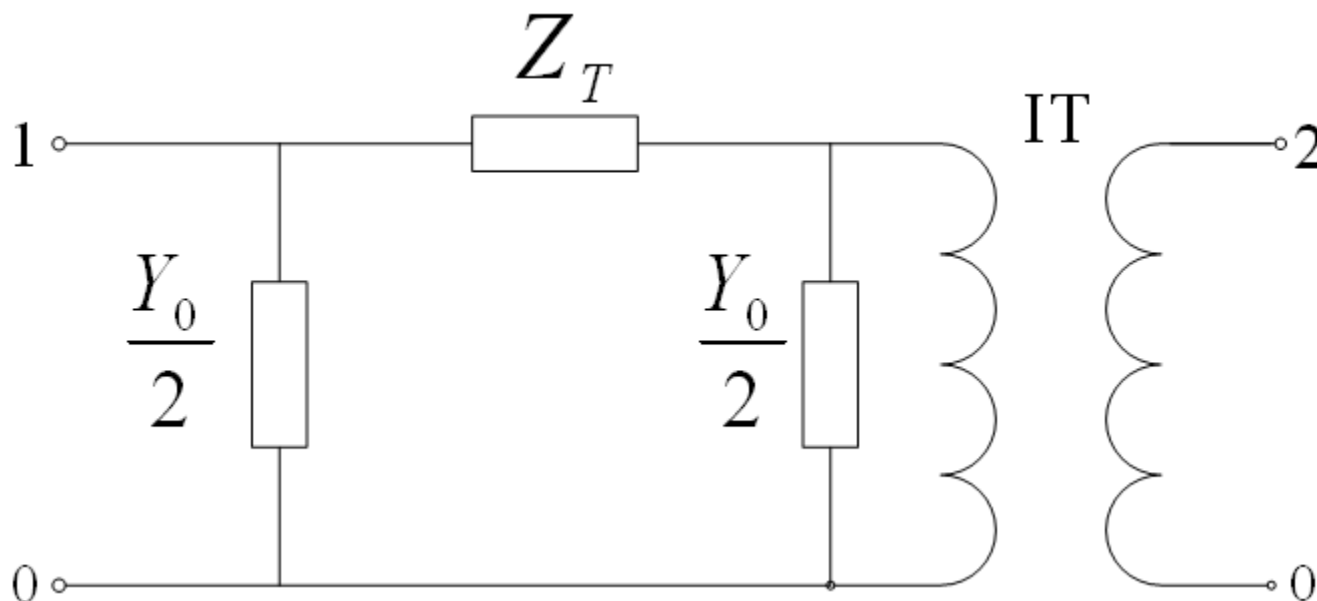


ANALIZA ELEKTROENERGETSKOG SUSTAVA

Predavanje br. 3.



- Natpisna pločica:

$S_n(MVA), u_k(\%), U_{n1}(kV), P_k(MW), i(\%), P_0(MW), w_1/w_2$

- Izvod na ploči:

$$Z_T = R + jX = \frac{U_n^2}{S_n} \left[\frac{P_k}{S_n} + j \sqrt{u_k^2 - \left(\frac{P_k}{S_n} \right)^2} \right] [\Omega]$$

$$Y_0 = \frac{S_n}{U_n^2} \left[\frac{P_0}{S_n} - j \sqrt{i_0^2 - \left(\frac{P_0}{S_n} \right)^2} \right] [S]$$

- Relativne veličine:

$$Z'_T = \left(\frac{U_B}{U_n}\right)^2 \cdot Z_T = \frac{U_B^2}{S_n} \left[\frac{P_k}{S_n} + j \sqrt{u_k^2 - \left(\frac{P_k}{S_n}\right)^2} \right] [\Omega]$$

$$Y'_0 = \left(\frac{U_n}{U_B}\right)^2 \cdot Y_0 = \frac{S_n}{U_B^2} \left[\frac{P_0}{S_n} - j \sqrt{i_0^2 - \left(\frac{P_0}{S_n}\right)^2} \right] [S]$$

- Jedinične veličine:

$$Z_{Tp.u.} = \frac{S_B}{U_B^2} \cdot Z_T = \frac{S_B}{S_n} \left[\frac{P_k}{S_n} + j \sqrt{u_k^2 - \left(\frac{P_k}{S_n}\right)^2} \right] [p.u.]$$

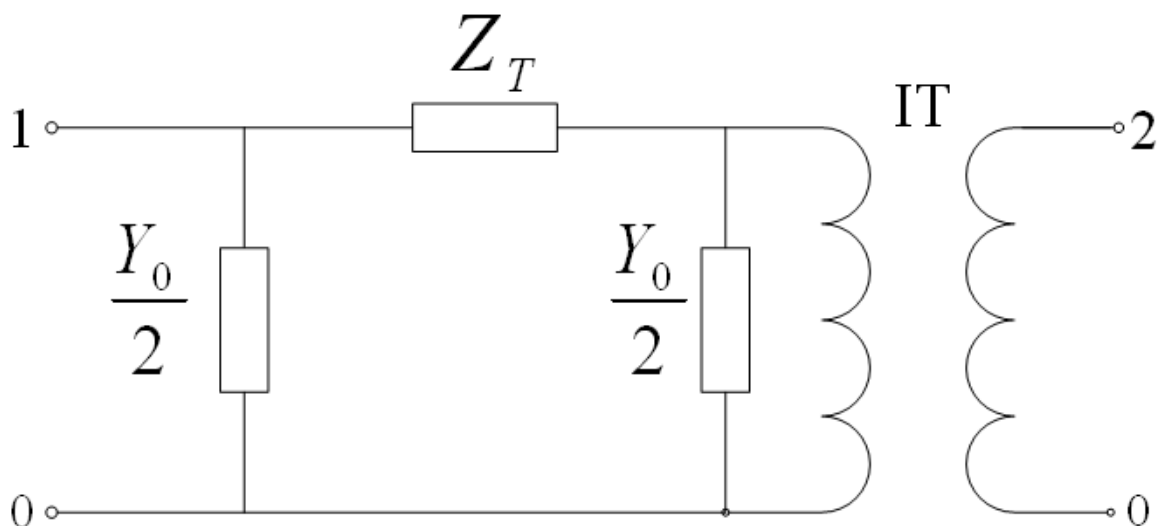
$$Y_{0p.u.} = \frac{U_B^2}{S_B} \cdot Y_0 = \frac{S_n}{S_B} \left[\frac{P_0}{S_n} - j \sqrt{i_0^2 - \left(\frac{P_0}{S_n}\right)^2} \right] [p.u.]$$

- PRIMJER:

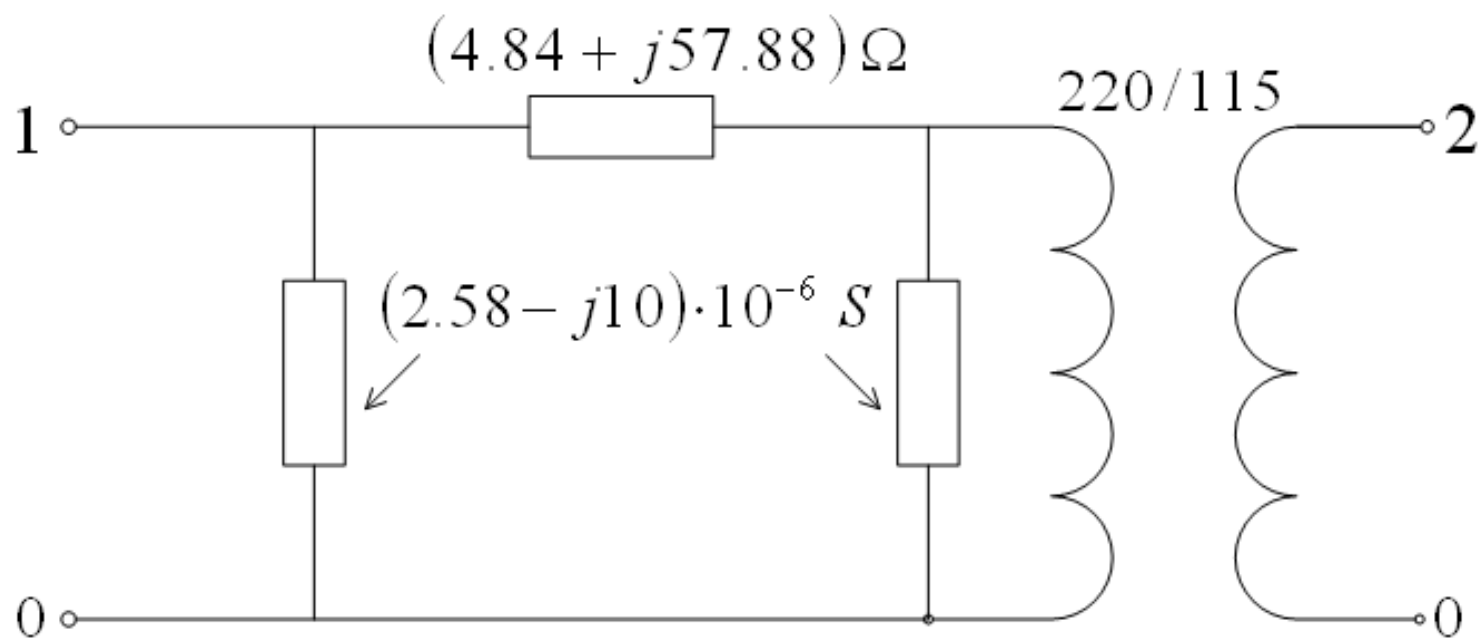
$$S_n = 100 \text{ MVA} ; u_k \% = 12\% ; i_0 = 1\%$$

$$P_k = 1\% \text{ od } S_n ; P_0 = 25\% P_k = 0,25\% \text{ od } S_n$$

Prijenosni odnos 220/115 kV

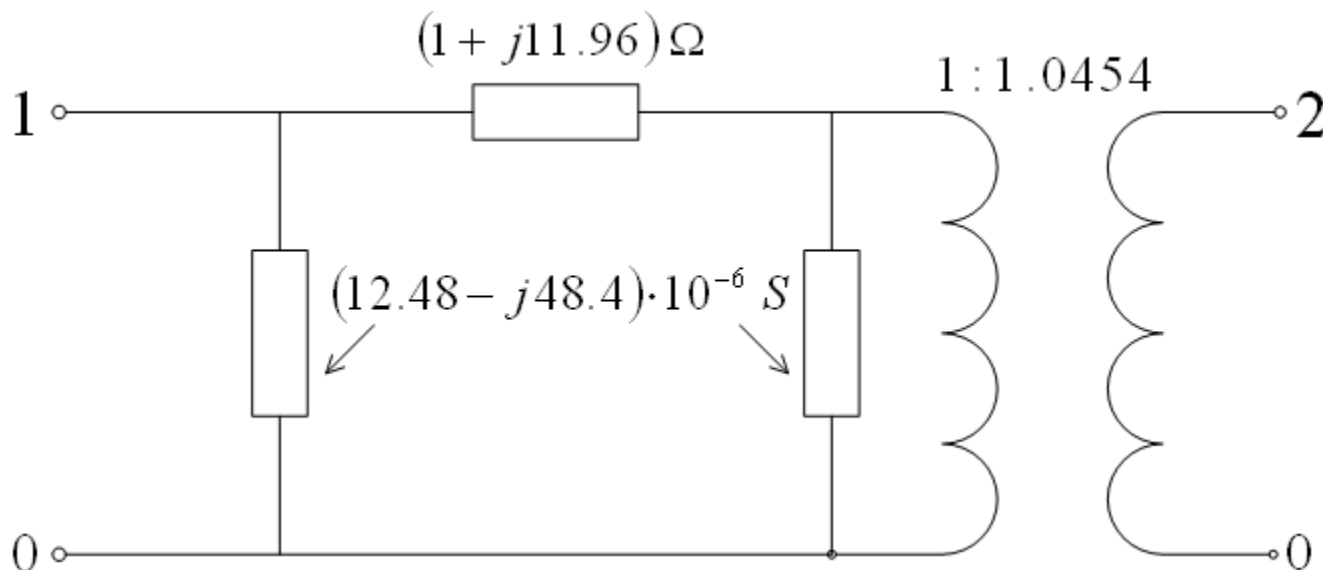


ANALIZA ELEKTROENERGETSKOG SUSTAVA - predavanje



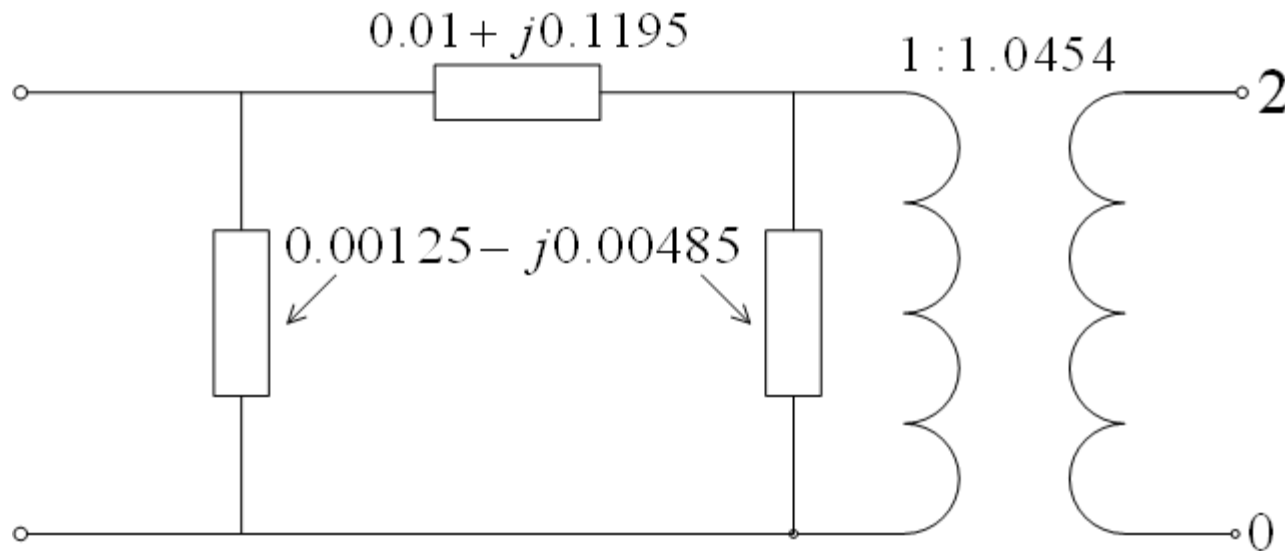
- Metoda otpora (relativne vrijednosti):

$$U_B = 100 \text{ kV}$$

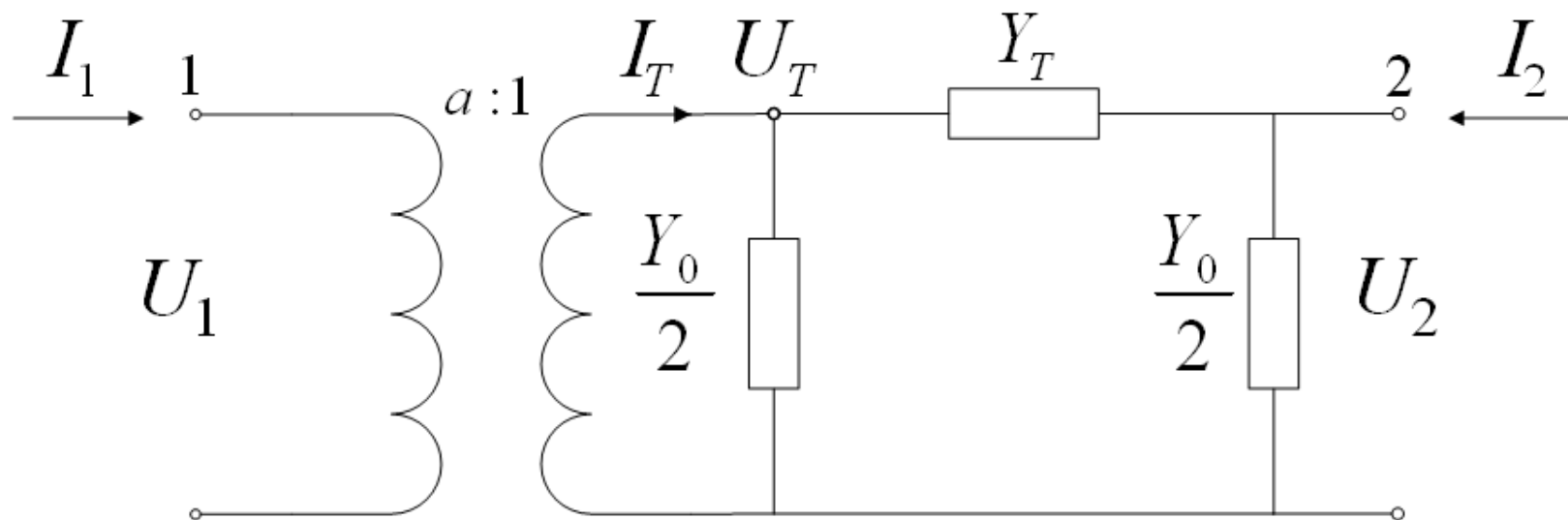


- Jedinične vrijednosti (p.u.):

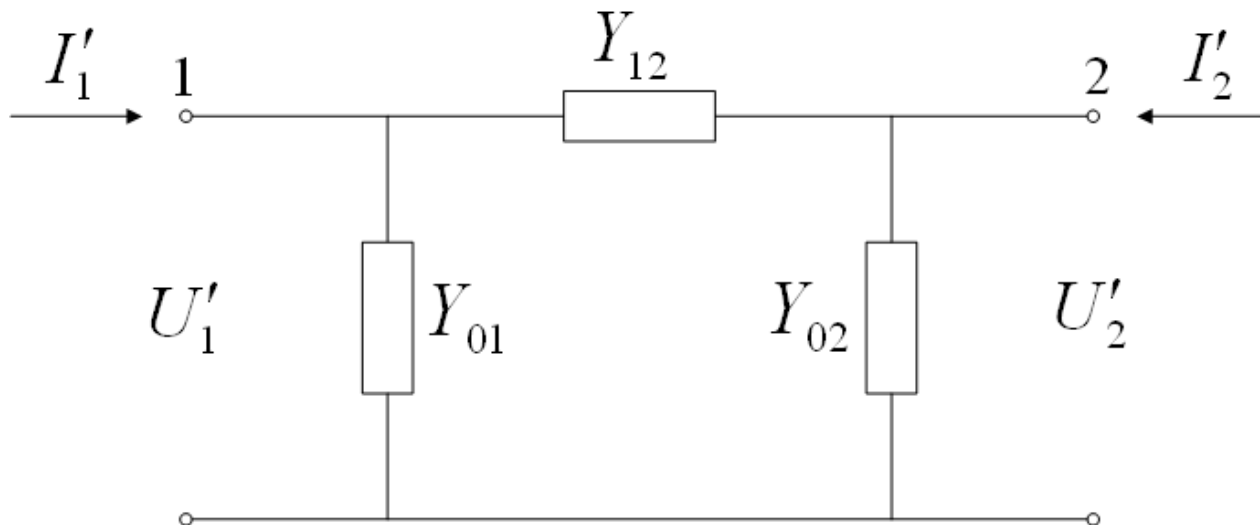
$$S_B = 100 \text{ MVA}$$



ANALIZA ELEKTROENERGETSKOG SUSTAVA - predavanje



$$\frac{U_1}{U_T} = a = \frac{I_T}{I_1}$$

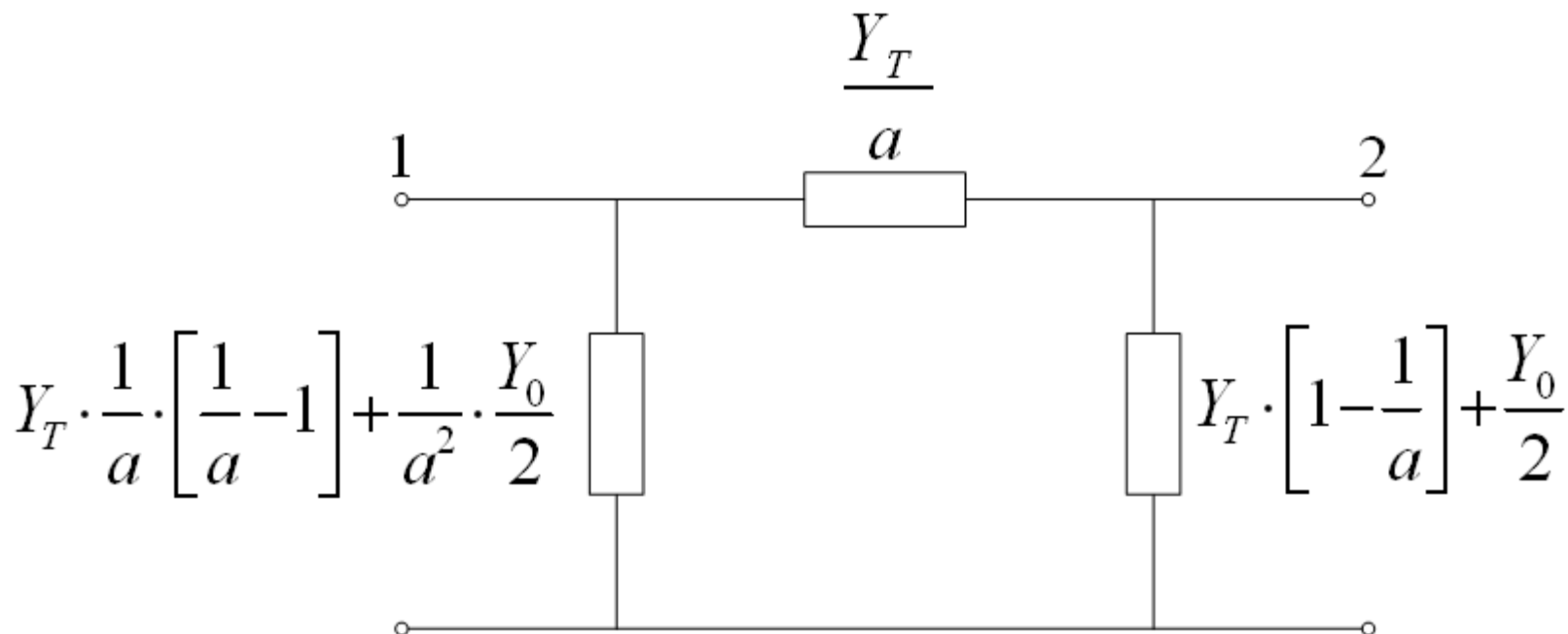


- Konačni rezultat

$$Y_{12} = \frac{Y_T}{a}$$

$$Y_{01} = Y_T \cdot \frac{1}{a} \cdot \left[\frac{1}{a} - 1 \right] + \frac{1}{a^2} \cdot \frac{Y_0}{2}$$

$$Y_{02} = Y_T \cdot \left[1 - \frac{1}{a} \right] + \frac{Y_0}{2}$$

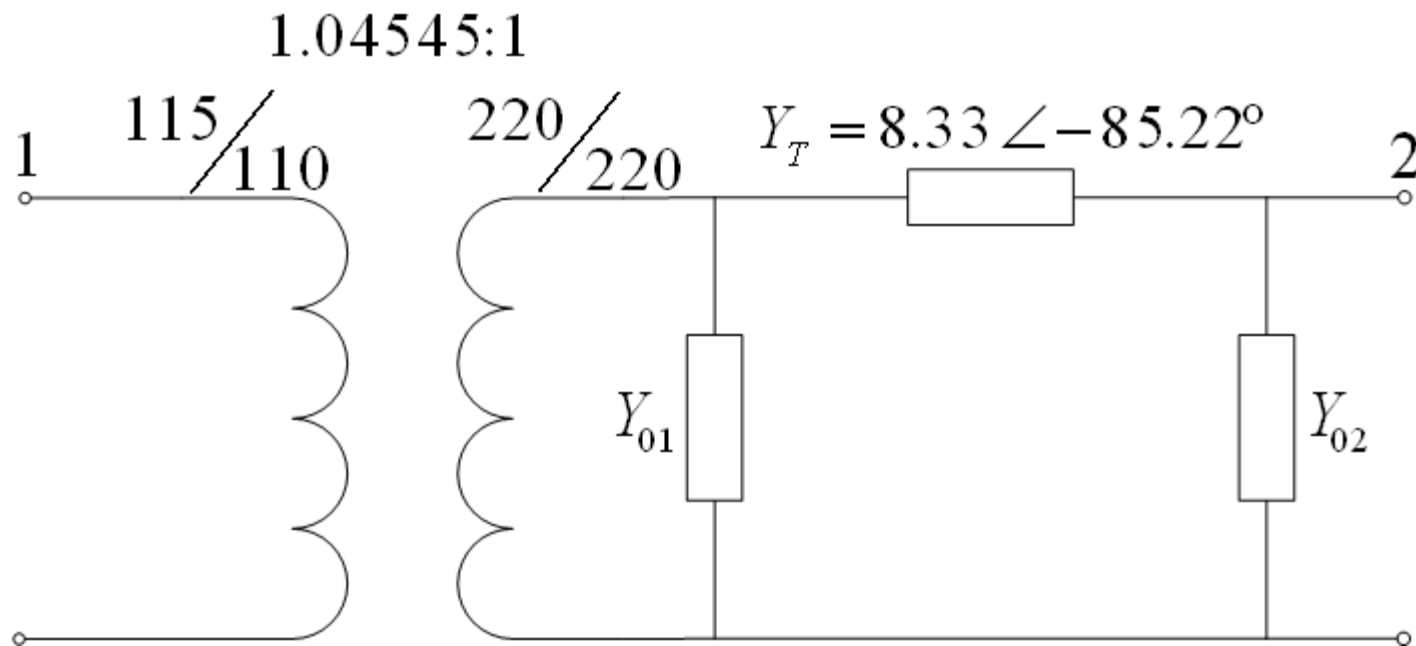


- Zapamti:

- Prijenosni omjer IT se izražava kao:

$$\frac{U_1 / U_{n1}}{U_2 / U_{n2}}$$

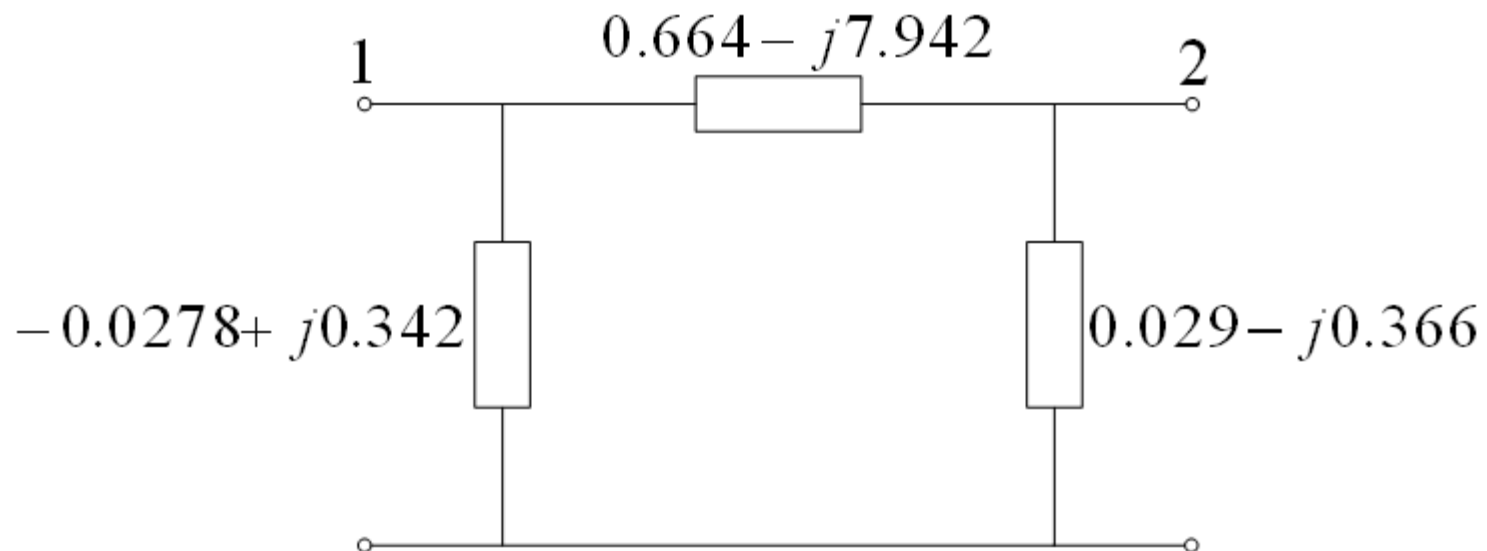
- PRIMJER:



$$Y_{12} = \frac{Y_T}{a} = \frac{8.33 \angle -85.22^\circ}{1.0454} = 7.97 \angle -85.22^\circ$$

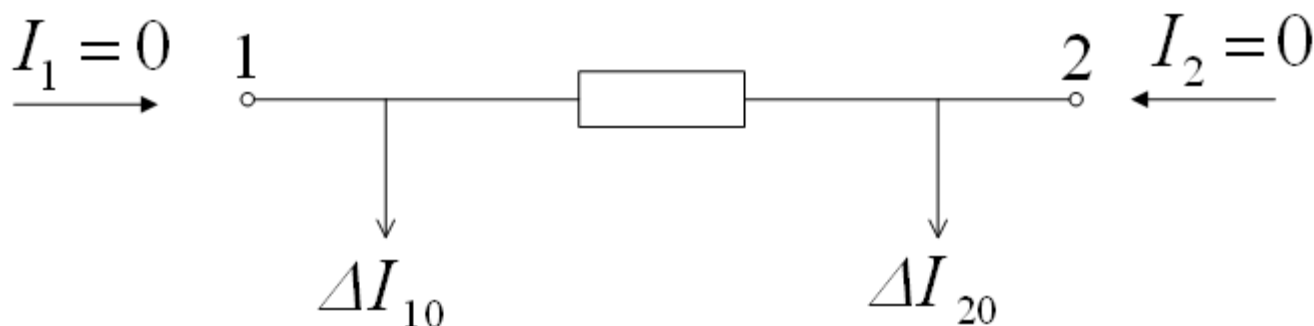
$$Y_{01} = Y_T \cdot \frac{1}{a} \cdot \left[\frac{1}{a} - 1 \right] + \frac{1}{a^2} \cdot \frac{Y_0}{2} = -0.0278 + j0.342$$

$$Y_{02} = Y_T \cdot \left[1 - \frac{1}{a} \right] + \frac{Y_0}{2} = 0.029 - j0.366$$



Y_0 – zanemarimo

- Prazni hod



$$\Delta I_{10} = U_1 \cdot (-0.0289 + j0.346)$$

$$\Delta I_{20} = U_2 \cdot (0.0302 - j0.361)$$

$$\sum I = 0$$

$$\Delta I_{10} = -\Delta I_{20}$$

$$\frac{U_1}{U_2} = \frac{0.0302 - j0.361}{0.0289 - j0.34} = \frac{0.3628 \angle 85.22^\circ}{0.3471 \angle 85.22^\circ} = 1.045$$

$$\Delta I_2 = U_2 \cdot Y_{02} = U_2 \cdot Y_T \cdot \left(1 - \frac{1}{a}\right)$$

$$\Delta I_1 = U_1 \cdot Y_{01} = U_1 \cdot Y_T \cdot \frac{1}{a} \cdot \left(\frac{1}{a} - 1\right)$$

$$\frac{U_1}{U_2} = a$$