

- Matematički model :

$$Y_B V_B = I_B$$

$$I_B = A J$$

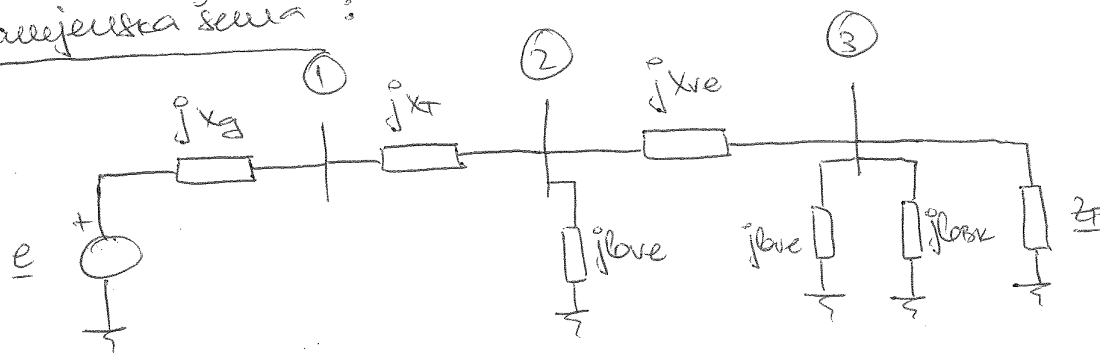
$$J = I_g - Y U_g$$

$$V_B = A Y A^T$$

$$U = A^T V_B$$

$$I = Y(U + U_g) - I_g$$

- Zamejska šema :



$$S_B = 220 \text{ MVA}$$

$$U_{B1} = 15,75 \text{ kV}$$

$$Z_{B1} = \frac{U_{B1}^2}{S_B} = \frac{15,75^2}{220} = 1,1276 \Omega$$

$$U_{B2} = 110 \text{ kV}$$

$$Z_{B2} = \frac{U_{B2}^2}{S_B} = \frac{110^2}{220} = 55 \Omega$$

$$x_g = \frac{\frac{110}{100} \cdot \frac{15,75^2}{220}}{1,1276} = 1,1$$

$$x_T = \frac{\frac{10}{100} \cdot \frac{15,75^2}{220}}{1,1276} = 0,1$$

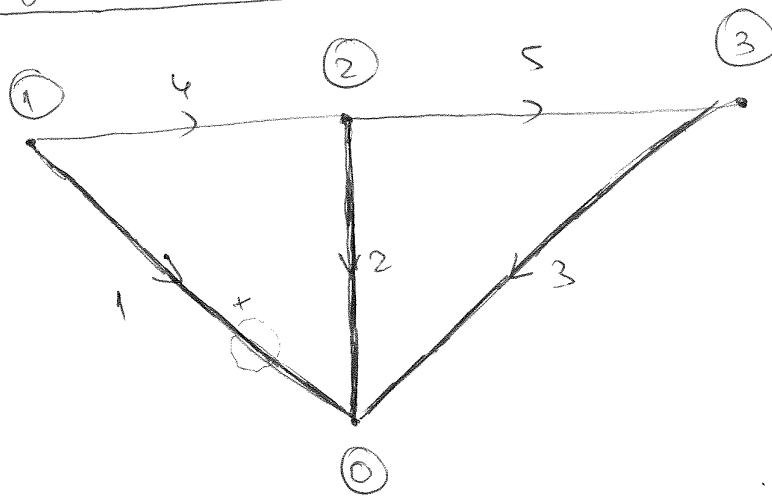
$$X_{ve} = \frac{\frac{1}{2} \cdot 0,28 \cdot 100}{55} = 0,2545$$

$$b_{ve} = 3 \cdot 10^{-6} \cdot 100 \cdot 55 = 0,165$$

$$\underline{Z}_P = \frac{\frac{110^2}{160 - j20}}{55} = 1,3538 + j0,1692$$

$$b_{bc} = \frac{20}{110^2} \cdot 55 = 0,0909$$

- Formiranje grafa mreže :



- Formiranje matrice A :

$$A = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & -1 & 1 \\ 0 & 0 & 1 & 0 & -1 \end{bmatrix} \end{matrix}$$

- Formiranje matrice Y :

$$Y = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} \frac{1}{jX_g} & & & & \\ & j b_{ve} & & & \\ & & \frac{1}{\underline{Z}_P} + j b_{ve} + j b_{bc} & & \\ & & & \frac{1}{jX_T} & \\ & & & & \frac{1}{jX_{ve}} \end{bmatrix} \end{matrix}$$

- Formiranje matrice admitansi čvorova:

$$Y_B = AY_A^T = \begin{bmatrix} -j10,9091 & j10 & 0 \\ j10 & -j12,8782 & j2,8947 \\ 0 & j2,8947 & 0,7273 - j2,8782 \end{bmatrix}$$

- Određivanje vektora injektiviranih struja  $I_B$ :

$$I_g = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$U_g = \begin{bmatrix} -1 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$J = I_g - Y U_g = \begin{bmatrix} -j0,9091 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$I_B = A J = \begin{bmatrix} -j0,9091 \\ 0 \\ 0 \end{bmatrix}$$

- Određivanje napona nezavisnih čvorova:

$$V_B = Y_B^{-1} I_B = \begin{bmatrix} 0,6046 - j0,3697 \\ 0,5687 - j0,4033 \\ 0,4413 - j0,5171 \end{bmatrix}$$

- Odrđivanje napona grana :

$$U = A^T V_B = \begin{bmatrix} 0,6046 - j0,3697 \\ 0,5687 - j0,4033 \\ 0,4413 - j0,5171 \\ 0,0359 + j0,0336 \\ -0,1274 + j0,1138 \end{bmatrix}$$

- Odrđivanje struja grana :

$$I = Y(U + U_g) - I_g = \begin{bmatrix} -0,3361 + j0,3594 \\ 0,0067 + j0,0094 \\ 0,3295 + j0,3688 \\ 0,3361 - j0,3594 \\ 0,3295 - j0,3688 \end{bmatrix}$$

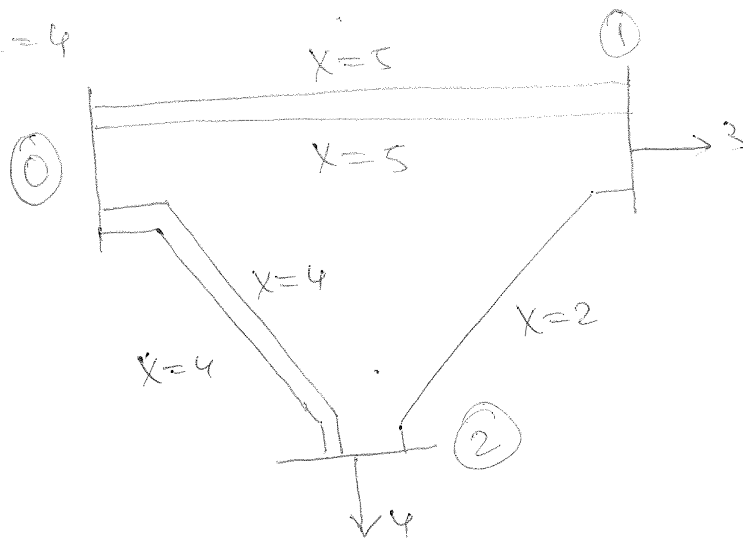
- Odrđivanje snage koje blok G-T predaje mreži :

$$\underline{S}_{GT} = \underline{V}_2 \underline{I}_4^* = 0,3361 + j0,0688$$

Da li je logično? Snaga potrošača je :

$$\underline{S}_P = \frac{V_3^2}{Z_P^*} = 0,3361 + j0,042$$

8)  $U_0 = U_R = 4$



Matematični model :

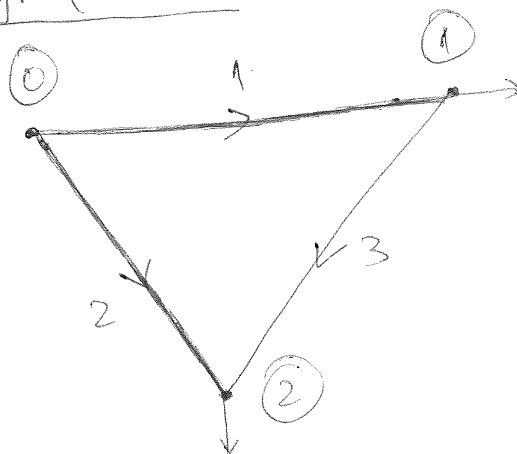
$$Y_B U_A = J + A(I_g - Y U_g)$$

$$U_A = \bar{U}_B - U_R$$

$$U = A^T U_A$$

$$I = Y(U + U_g) - I_g$$

Funkcijski graf ureže :



Funkcijski matrica A :

$$A = \begin{matrix} & \begin{matrix} 1 & 2 & 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \end{matrix} & \begin{bmatrix} -1 & 0 & 1 \\ 0 & -1 & -1 \end{bmatrix} \end{matrix}$$

- Formirajmo matrice admitansi grana :

$$Y = \begin{matrix} & \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} \frac{1}{j2,5} & 0 & 0 \\ 0 & \frac{1}{j2} & 0 \\ 0 & 0 & \frac{1}{j2} \end{bmatrix} \end{matrix}$$

- Formirajmo matrice admitansi čvorova :

$$Y_B = A Y A^T = \begin{bmatrix} -j0,9 & j0,5 \\ j0,5 & -j1 \end{bmatrix}$$

- Formirajmo vektora  $U_g$  i  $I_g$  :

$$U_g = I_g = \begin{matrix} & \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \end{matrix}$$

- Formirajmo vektora  $J$  :

$$J = \begin{matrix} & \begin{matrix} 1 \\ 2 \end{matrix} \\ \begin{matrix} 1 \\ 2 \end{matrix} & \begin{bmatrix} -3 \\ -4 \end{bmatrix} \end{matrix}$$

- Odredimo vektora  $U_\Delta$  :

$$U_\Delta = Y_B^{-1} J = \begin{bmatrix} -j7,69 \\ -j7,85 \end{bmatrix}$$

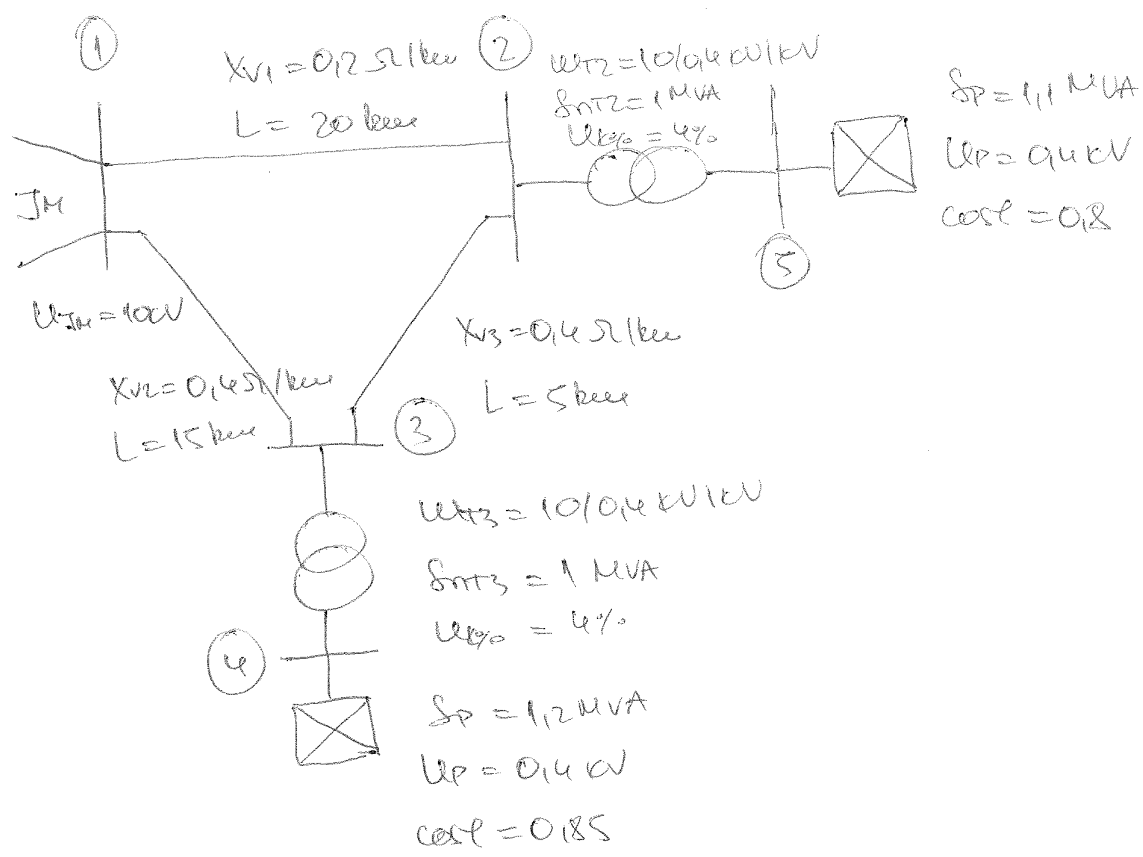
- Odredimo vektora  $U$  grana :

$$U = A^T U_\Delta = \begin{bmatrix} j7,69 \\ j7,85 \\ j0,15 \end{bmatrix}$$

- Odredimo snagu grana :

$$I = Y(U + U_g) - I_g = YU = \begin{bmatrix} 3,077 \\ 3,923 \\ 0,077 \end{bmatrix}$$

7.



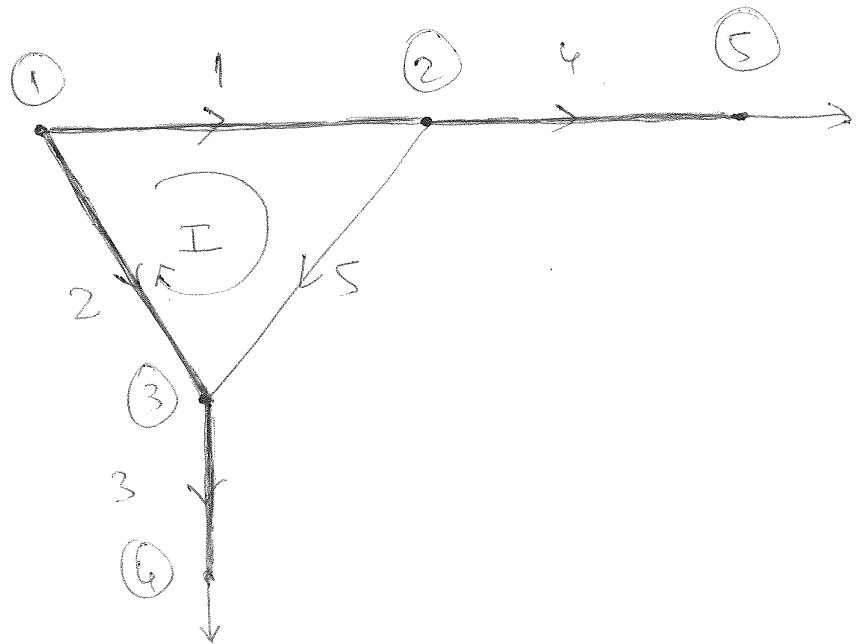
- Matematički model :

$$Z_L I_L = V_L - B^T \begin{bmatrix} A^T \\ 0 \end{bmatrix}$$

$$I = B^T I_L + \begin{bmatrix} A^T \\ 0 \end{bmatrix}$$

$$U = Z(I + I_g) - U_g$$

- Formiranje grafa mreže :



- Formação de matriz  $A$  e  $B$ :

$$A = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} -1 & 0 & 0 & 1 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{bmatrix} \end{matrix} \quad \left| \begin{matrix} 5 \\ 1 \\ -1 \\ 0 \\ 0 \end{matrix} \right.$$

$A_S \quad A_R$

$$B = I \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & -1 & 0 & 0 & 1 \end{bmatrix}$$

- Formação de matriz  $Z$  e  $Z_L$ :

$$Z = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} j4 & & & & \\ & j6 & & & \\ & & j4 & & \\ & & & j4 & \\ & & & & j2 \end{bmatrix} \end{matrix}$$

$$Z_L = BZB^T = j12$$

- Formação de vetor  $V_L$ :

$$\left. \begin{aligned} V_L &= BE = B(V_g - ZI_g) \\ V_g &= I_g = [0]_{5 \times 1} \end{aligned} \right\} \rightarrow V_L = [0]_{1 \times 1}$$

- Formação de vetor  $J$ :

$$\underline{I}_{P4} = \left( \frac{S_{P4}}{\sqrt{3} \underline{U}_{P4}^{sv}} \right)^* = \frac{S_{P4} (\cos \phi_4 - j \sin \phi_4)}{\sqrt{3} \cdot U_{P4}^{sv}} = (58,89 - j36,5) A$$

$$\underline{I}_{PS} = \left( \frac{S_{PS}}{\sqrt{3} \underline{U}_{PS}^{sv}} \right)^* = (50,81 - j38,11) A$$

$$J = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} 0 \\ 0 \\ 0 \\ -58,89 + j36,5 \\ -50,81 + j38,11 \end{bmatrix} \end{matrix}$$



- Odredivanje strujne nezavisne komponente:

$$I_L = Z^{-1} V_L - Z^{-1} B^T \begin{bmatrix} A s^{-1} \\ 0 \end{bmatrix} J =$$

$$= -\frac{1}{j12} \begin{bmatrix} 1 & -1 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} j4 & & & & \\ & j6 & & & \\ & & j4 & & \\ & & & j4 & \\ & & & & j2 \end{bmatrix} \begin{bmatrix} -1 & 0 & 0 & -1 \\ 0 & -1 & -1 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 0 \\ -58,89 + j36,5 \\ -50,81 + j38,11 \end{bmatrix}$$

$$= (12,51 - j5,55) A$$

- Odredivanje strujne grane:

$$I = B^T I_L + \begin{bmatrix} A s^{-1} \\ 0 \end{bmatrix} J = \begin{bmatrix} 63,32 - j43,66 \\ 46,38 - j30,95 \\ 50,81 - j38,11 \uparrow \\ 58,89 - j36,5 \downarrow \\ 12,51 - j5,55 \end{bmatrix} A$$

- Odredivanje napona grane:

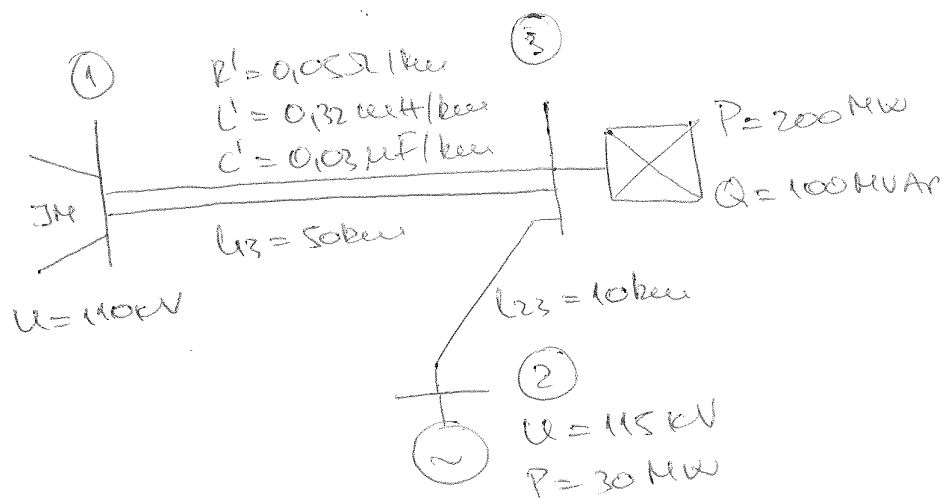
$$U = Z(I + I_g) - U_g = \begin{bmatrix} 0,17 + j0,125 \\ 0,19 + j0,28 \\ 0,15 + j0,12 \uparrow \\ 0,15 + j0,24 \downarrow \\ 0,01 + j0,03 \end{bmatrix} kV$$

- Odredivanje snage potrošača:

$$S_{P4} = \sqrt{3} U_{P4} I_{P4}^* = \sqrt{3} (U_1 - U_2 - U_3) I_{P4}^* = (1,02 + j0,56) MVA$$

$$S_{P5} = \sqrt{3} U_{P5} I_{P5}^* = \sqrt{3} (U_1 - U_1 - U_4) I_{P5}^* = (0,88 + j0,6) MVA$$

6.

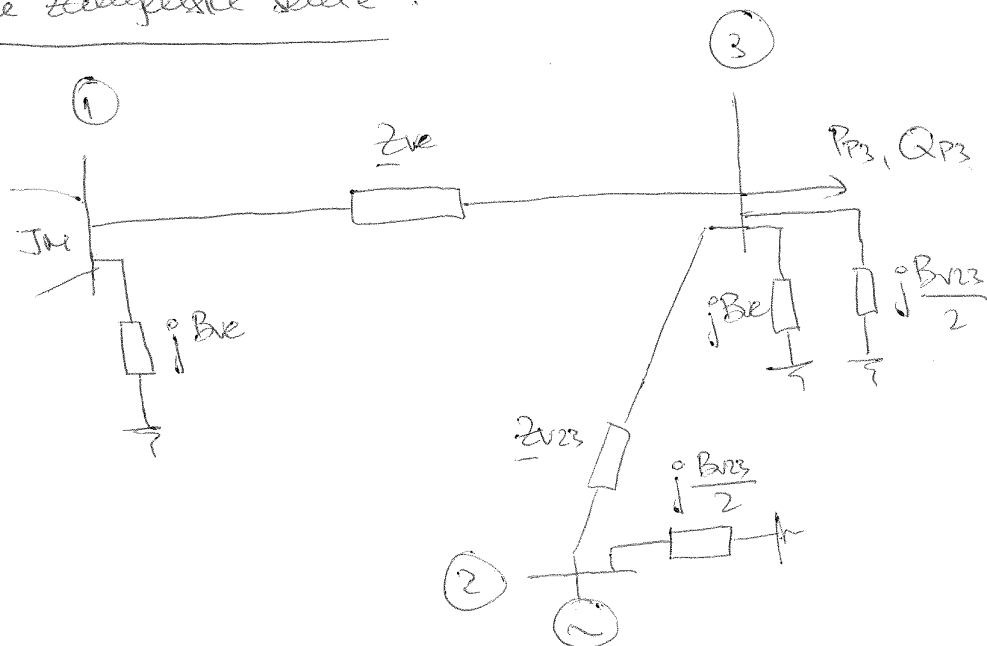


- Matematički model :

$$\underline{U}_i^{(k+1)} = \frac{1}{Y_{ii}} \left[ \frac{P_i - jQ_i}{\underline{U}_i^{(k)*}} - \sum_{j=1}^{i-1} \underline{Y}_{ij} \underline{U}_j^{(k+1)} - \sum_{j=i+1}^n \underline{Y}_{ij} \underline{U}_j^{(k)} \right]$$

$$Q_i^{(k+1)} = -I_{ei} \left\{ \underline{U}_i^{(k)*} \left[ \sum_{j=1}^{i-1} \underline{Y}_{ij} \underline{U}_j^{(k+1)} + \sum_{j=i+1}^n \underline{Y}_{ij} \underline{U}_j^{(k)} \right] \right\}$$

- Funkcijske zveze u šemi :



$$\underline{Z}_{12} = \frac{1}{2} (R' + j\omega L') \cdot l_{12} = (1.25 + j2.15) \Omega$$

$$B_{12} = 2\omega C' \cdot l_{12} = 0.00094 \text{ S}$$

$$\underline{Z}_{23} = (R' + j\omega L') \cdot l_{23} = (0.5 + j1.05) \Omega$$

$$B_{23} = \omega C' \cdot l_{23} = 0.000094 \text{ S}$$

- Fonciranje matrice admitansi čvorak :

$$Y_B = \begin{bmatrix} 1 & \frac{1}{Z_{2e}} + j\frac{B_{2e}}{2} & 0 & -\frac{1}{Z_{2e}} \\ 2 & 0 & \frac{1}{Z_{23}} + j\frac{B_{23}}{2} & -\frac{1}{Z_{23}} \\ 3 & -\frac{1}{Z_{2e}} & -\frac{1}{Z_{23}} & \frac{1}{Z_{2e}} + \frac{1}{Z_{23}} + j\frac{B_{23}}{2} \end{bmatrix} =$$

$$= \begin{bmatrix} 0,1586 - j0,318 & 0 & -0,1586 + j0,319 \\ 0 & 0,3966 - j0,7974 & -0,3966 + j0,7975 \\ -0,1586 + j0,319 & -0,3966 + j0,7975 & 0,5553 - j1,1164 \end{bmatrix}$$

- Čvor 1 :

Čvor 1 je balansni čvor, pa su uvedeni i fizički step napona uspořád definisani.

- Čvor 2 :

Čvor 2 je generatorski čvor, pa je uplaido izvršiti procjenu i efektivne reaktivne snage:

$$Q_2^{(1)} = -I_{2e} \left\{ \underline{U}_2^{(1)*} \left[ \cancel{Y_{21}} \underline{U}_1^{(1)} + Y_{22} \underline{U}_2^{(1)} + Y_{23} \underline{U}_3^{(1)} \right] \right\} =$$

$$= -I_{2e} \left\{ 115 \cdot \left[ (0,3966 - j0,7974) \cdot 115 + (-0,3966 + j0,7975) \cdot 110 \right] \right\} =$$

$$= 457,9 \text{ MVAR}$$

Tako je napon u čvoru 2 :

$$\underline{U}_2^{(1)} = \frac{1}{Y_{22}} \left[ \frac{P_2 - jQ_2^{(1)}}{\underline{U}_2^{(1)*}} - \cancel{Y_{21}} \underline{U}_1^{(1)} - Y_{23} \underline{U}_3^{(1)} \right] =$$

$$= \frac{1}{0,3966 - j0,7974} \left[ \frac{30 - j457,9}{115} - (-0,3966 + j0,7975) \cdot 110 \right] =$$

$$= (114,14 - j1,74) = 114,16 \angle -0,87^\circ \text{ kV}$$

Uz pretpostavku da se generator uvek i unutar svog regulacionog opsega u pogledu reaktivne snage, napon u čvoru 2 je:

$$\underline{U}_2^{(1)} = 115 \angle -0,87^\circ = (114,99 - j1,75) \text{ kV}$$

- Čvor 3:

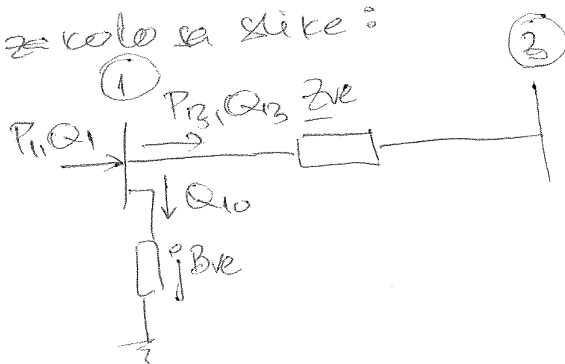
Čvor 3 je potrošači čvor, pa se napon određuje pripremljenom relacijom:

$$\begin{aligned} \underline{U}_3^{(1)} &= \frac{1}{Y_{33}} \left[ \frac{P_3 - jQ_3}{\underline{U}_3^{(0)*}} - Y_{31} \underline{U}_1^{(0)} - Y_{32} \underline{U}_2^{(1)} \right] = \\ &= \frac{1}{0,558 - j1,1164} \left[ \frac{-200 + j100}{110} - (-0,1586 + j0,319) \cdot 110 - (-0,3966 + j0,7975) \cdot \underline{U}_2^{(1)} \right] = \\ &= ~~114,99~~ 112,26 - j223 = 112,25 \angle -1,14^\circ \text{ kV} \end{aligned}$$

Drine se kompletira jedna iteracija Gauss-Seidelovog metoda za proračun tokova snaga.

Neka je napon na sabirnicama potrošača  $\underline{U}_3 = 113,2 \angle -2^\circ \text{ kV}$ .

Tada se sklopi shema:



važi:

$$\underline{U}_3 = \underline{U}_1 - \frac{P_{13} R_{ve} + Q_{13} X_{ve}}{\underline{U}_1} - j \frac{P_{13} X_{ve} - Q_{13} R_{ve}}{\underline{U}_1}$$

Izjednačavajući realni i imaginarni deo sledi:

$$\text{Re}\{\underline{U}_3\} = \underline{U}_1 - \frac{P_{13} R_{ve} + Q_{13} X_{ve}}{\underline{U}_1}$$

$$\text{Im}\{\underline{U}_3\} = - \frac{P_{13} X_{ve} - Q_{13} R_{ve}}{\underline{U}_1}$$

Zaenjenen brojnih vrijednosti slijedi:

$$112,12 = 110 - \frac{1,25 P_{13} + 2,513 Q_{13}}{110}$$

$$6,19 = \frac{2,513 P_{13} - 1,25 Q_{13}}{110}$$

Čijine njezinih slijedi:

$$P_{13} = 180,2 \text{ MW}$$

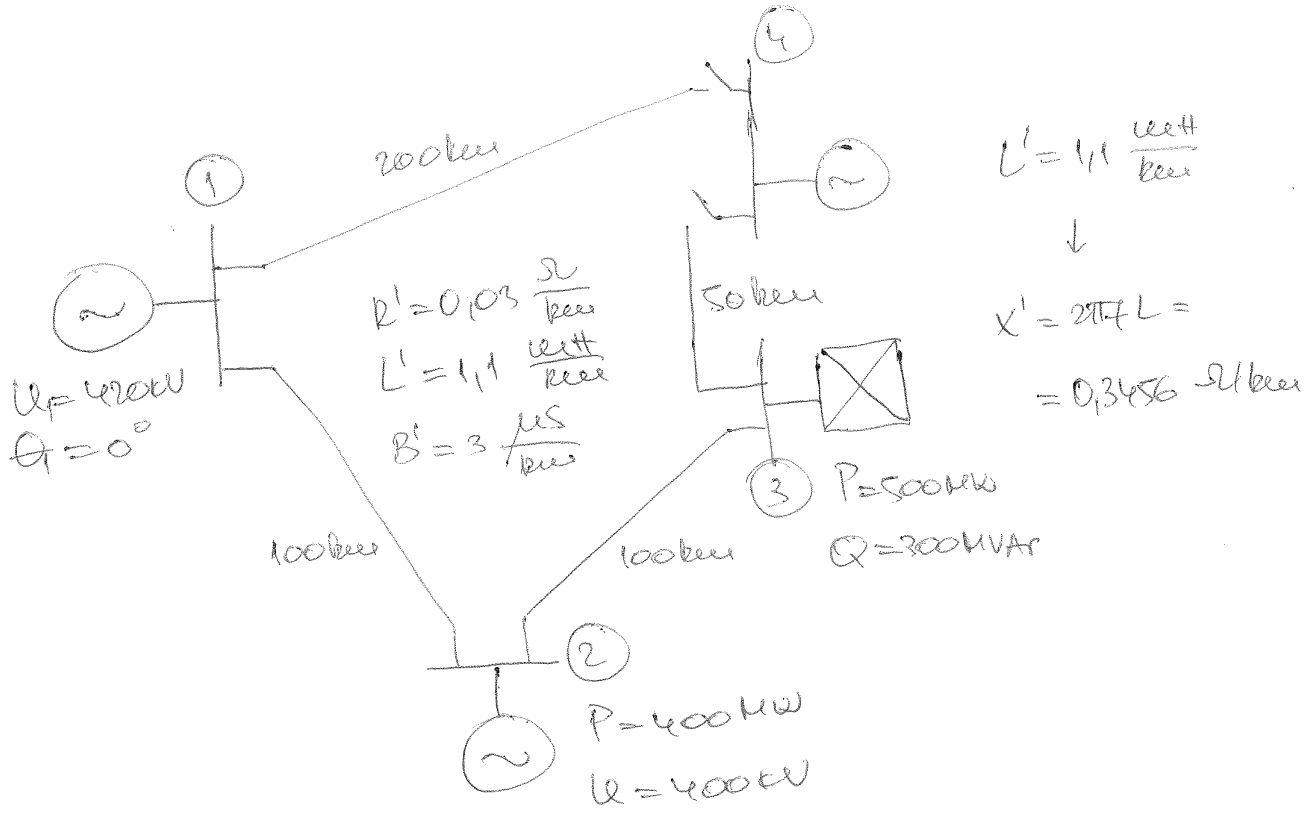
$$Q_{13} = -182,4 \text{ MVAR}$$

Tada je snaga koju je mreža isporučuje:

$$P_1 = P_{13} = \boxed{180,2 \text{ MW}}$$

$$Q_1 = Q_{13} + Q_{10} = -182,4 + 0,000034 \cdot 110^2 = \boxed{-181,3 \text{ MVAR}}$$

4.

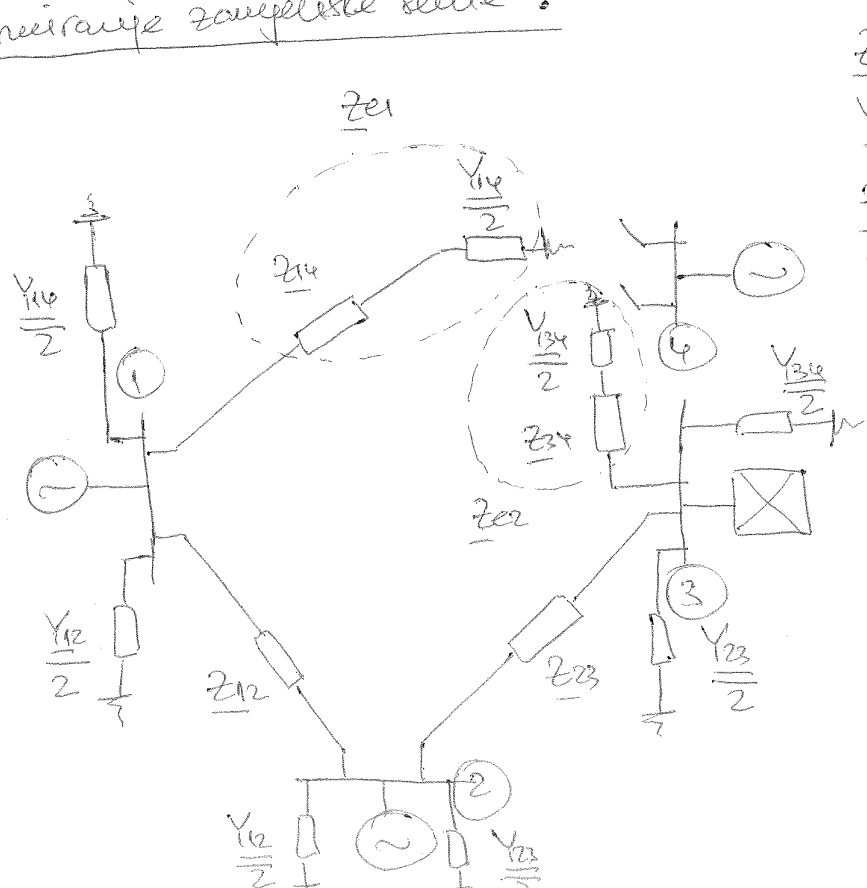


- Matematički model :

$$\underline{U}_i^{(k+1)} = \frac{1}{Y_{ii}} \left[ \frac{P_i - jQ_i}{\underline{U}_i^{(k)*}} - \sum_{j=1}^{i-1} Y_{ij} \underline{U}_j^{(k+1)} - \sum_{j=i+1}^n Y_{ij} \underline{U}_j^{(k)} \right]$$

$$Q_i^{(k+1)} = -\text{Im} \left\{ \underline{U}_i^{(k)*} \left[ \sum_{j=1}^{i-1} Y_{ij} \underline{U}_j^{(k+1)} + \sum_{j=i+1}^n Y_{ij} \underline{U}_j^{(k)} \right] \right\}$$

- Formiranje zamjenjive šeme :



$$\underline{Z}_{12} = (3 + j34.67) \Omega$$

$$\underline{Y}_{12} = (j0.0003) \text{ S}$$

$$\underline{Z}_{23} = (3 + j34.67) \Omega$$

$$\underline{Y}_{12} = (j0.0003) \text{ S}$$

$$\underline{Z}_{14} = (6 + j69.34) \Omega$$

$$\underline{Y}_{14} = (j0.0006) \text{ S}$$

$$\underline{Z}_{34} = (1.5 + j17.33) \Omega$$

$$\underline{Y}_{34} = (j0.00015) \text{ S}$$

$$\underline{Z}_{e1} = \underline{Z}_{14} + \frac{2}{\underline{Y}_{14}} = (6 - j3264) \Omega$$

$$\underline{Z}_{e2} = \underline{Z}_{34} + \frac{2}{\underline{Y}_{34}} = (115 - j13316) \Omega$$

- Formiranje matrice admićanskih čvorov:

$$\underline{Y}_B = \begin{matrix} & \begin{matrix} 1 & 2 & 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} \frac{1}{\underline{Z}_{12}} + \frac{\underline{Y}_{12}}{2} + \frac{\underline{Y}_{14}}{2} + \frac{1}{\underline{Z}_{e1}} & -\frac{1}{\underline{Z}_{12}} & 0 \\ -\frac{1}{\underline{Z}_{12}} & \frac{1}{\underline{Z}_{12}} + \frac{1}{\underline{Z}_{23}} + \frac{\underline{Y}_{12}}{2} + \frac{\underline{Y}_{23}}{2} & -\frac{1}{\underline{Z}_{23}} \\ 0 & -\frac{1}{\underline{Z}_{23}} & \frac{1}{\underline{Z}_{23}} + \frac{1}{\underline{Z}_{e2}} + \frac{\underline{Y}_{23}}{2} + \frac{\underline{Y}_{34}}{2} \end{bmatrix} \end{matrix} =$$

$$= \begin{matrix} & \begin{matrix} 1 & 2 & 3 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} 0,0025 - j0,0279 & -0,0025 + j0,0286 & 0 \\ -0,0025 + j0,0286 & 0,005 - j0,057 & -0,0025 + j0,0286 \\ 0 & -0,0025 + j0,0286 & 0,0025 - j0,0283 \end{bmatrix} \end{matrix}$$

- Pretpostavljamo početne vrijednosti napona:

$$\underline{U}_1^{(0)} = 420 + j0 = 420 \angle 0^\circ \text{ kV}$$

$$\underline{U}_2^{(0)} = 400 + j0 = 400 \angle 0^\circ \text{ kV}$$

$$\underline{U}_3^{(0)} = 400 + j0 = 400 \angle 0^\circ \text{ kV}$$

- Prvi čvor:

Čvor 1 je bodavni čvor, pa se za njega ne definiše napon i fazei stav napona.

- Čvor 2 :

Čvor 2 je generatorski čvor, pa je za njega neposredno procijeniti injektivirajuće reaktivne snage :

$$Q_2^{(1)} = -I_{ee} \left\{ \underline{U}_2^{(1)*} \left[ \underline{Y}_{21} \underline{U}_1^{(1)} + \underline{Y}_{22} \underline{U}_2^{(1)} + \underline{Y}_{23} \underline{U}_3^{(1)} \right] \right\} =$$

$$= -I_{ee} \left\{ 400 \cdot \left[ (-0,0025 + j0,0286) \cdot 420 + (0,005 - j0,057) \cdot 400 + (-0,0025 + j0,0286) \cdot 400 \right] \right\}$$

$$= -277 \text{ MVAR}$$

Pa je napori u čvornu 2 tada :

$$\underline{U}_2^{(1)} = \frac{1}{\underline{Y}_{22}} \left[ \frac{P_2 - jQ_2}{\underline{U}_2^{(1)*}} - \underline{Y}_{21} \underline{U}_1^{(1)} - \underline{Y}_{23} \underline{U}_3^{(1)} \right] =$$

$$= \frac{1}{0,005 - j0,057} \left[ \frac{400 + j277}{400} - (-0,0025 + j0,0286) \cdot 420 - (-0,0025 + j0,0286) \cdot 400 \right] =$$

$$= 400,298 + j18,342 = 401,32 \angle 2,62^\circ \text{ kV}$$

Uz pretpostavku da se generator uskladi unutar svoj regulacijskog opsega, napori u čvornu 2 je :

$$\underline{U}_2^{(1)} = 400 \angle 2,62^\circ = (399,58 + j18,28) \text{ kV}$$

- Čvor 3 :

Čvor 3 je potrošački čvor, pa se za određivanje napona može koristiti :

$$\underline{U}_3^{(1)} = \frac{1}{\underline{Y}_{33}} \left[ \frac{P_3 - jQ_3}{\underline{U}_3^{(1)*}} - \cancel{\underline{Y}_{31} \underline{U}_1^{(1)}} - \underline{Y}_{32} \underline{U}_2^{(1)} \right] =$$

$$= \frac{1}{0,0025 - j0,0283} \left[ \frac{-500 + j300}{400} - (-0,0025 + j0,0286) \cdot (399,58 + j18,28) \right] =$$

$$= 373,696 - j23,385 = 374,43 \angle -3,58^\circ \text{ kV}$$



Izdužavanje daljine voda 1-4 i 3-4 sa druge strane bi rezultiralo  
značajnijim smanjenjem napona potrošača. Radom daljine voda u  
praznom vodi na njemu se javljaju kapacitivni gubici (daljine vodi  
"inertivni" reaktive snage u mreži) čime se rasterećuje  
generatori 1 i 2 u pogledu reaktive snage i povećava napona  
polike u sistemu.