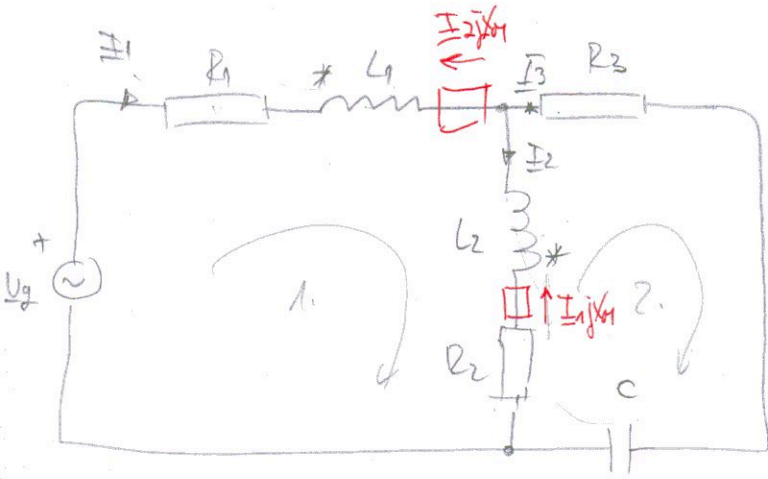


35. Zbirana mreza



- $U_g = 100V$
- $R_1 = 20\Omega$
- $R_2 = R_3 = 10\Omega$
- $X_L = 10\Omega$
- $X_{L2} = 20\Omega$
- $X_C = 10\Omega$
- $X_M = 5\Omega$

$I_1, I_2, I_3 = ?$

1) $I_1(R_1 + jX_{L1} - jX_M) + I_2(R_2 + jX_{L2} - jX_M) = U_g$

2) $I_3(R_3 - jX_C) + I_1 jX_M - I_2(R_2 + jX_{L2}) = 0$

⑤ $I_3 = I_1 - I_2 = 2,582 + 0,875A$

A: $I_1 = I_2 + I_3$

② $I_1 = I_2 + \frac{I_2(R_2 + jX_{L2}) - I_1 jX_M}{R_3 - jX_C}$

$I_1(R_3 - jX_C + jX_M) = I_2(R_3 - jX_C + R_2 + jX_{L2})$

1) ③ $I_2 = \frac{I_1(R_3 - jX_C + jX_M)}{R_3 - jX_C + R_2 + jX_{L2}}$

$I_1(R_1 + jX_{L1} - jX_M) + I_1 \cdot \frac{R_3 - jX_C + jX_M}{R_3 - jX_C + R_2 + jX_{L2}} \cdot (R_2 + jX_{L2} - jX_M) = U_g$

$I_1 = \frac{U_g}{R_1 + jX_{L1} - jX_M + \frac{(R_3 - jX_C + jX_M) \cdot (R_2 + jX_{L2} - jX_M)}{R_3 + R_2 - jX_C + jX_{L2}}}$

$I_2 = \frac{I_1 \cdot (10 - j5)}{20 + j10}$

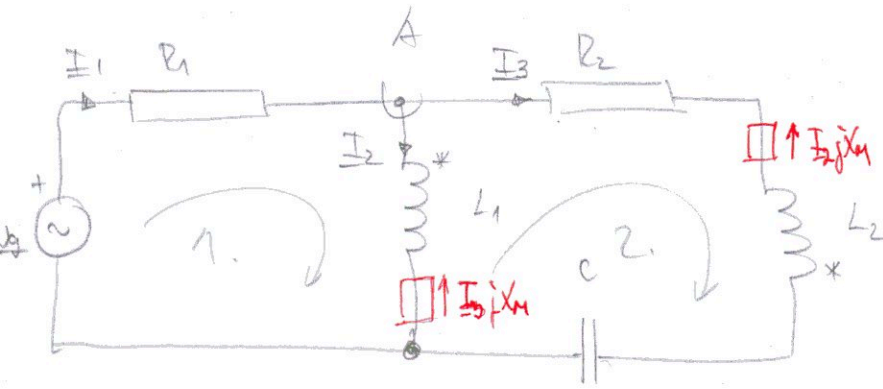
$I_2 = 0,746 - 1,521A$

$I_1 = \frac{100}{20 + j5 + \frac{(10 - j5) \cdot (10 + j15)}{20 + j10}}$

$= \frac{100 \cdot (20 + j10)}{(20 + j5) \cdot (20 + j10) + (10 - j5) \cdot (10 + j15)}$

$= \frac{2000 + j1000}{400 + j200 + j100 - 50 + 100 + j150 - j50 + 75}$

$= \frac{2000 + j1000}{525 + j400} = 3,324 - j0,6313A$



$U_g = 100V$
 $R_1 = R_2 = 5\Omega$
 $X_{L1} = X_{L2} = 10\Omega$
 $X_C = 20\Omega$
 $X_M = 5\Omega$

1) $I_1 R_1 + I_2 jX_{L1} - I_3 jX_M = U_g$

A: $I_1 = I_2 + I_3$

2) $I_3 (R_2 + jX_{L2} - jX_C + jX_M) - I_2 (jX_{L1} + jX_M) = 0$

1. ↓

$$I_2 = \frac{I_3 (R_2 + jX_{L2} - jX_C + jX_M)}{jX_{L1} + jX_M}$$

$$I_1 = I_3 \left(1 + \frac{R_2 + jX_{L2} - jX_C + jX_M}{jX_{L1} + jX_M} \right)$$

$$R_1 I_3 \left(1 + \frac{R_2 + jX_{L2} - jX_C + jX_M}{jX_{L1} + jX_M} \right) + I_3 jX_{L1} \frac{R_2 + jX_{L2} - jX_C + jX_M}{jX_{L1} + jX_M} - I_3 jX_M = U_g$$

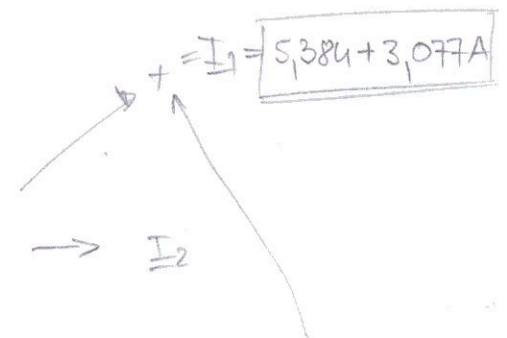
$$I_3 \left(\frac{5}{R_1} + \frac{5}{R_1} \frac{10 - j20 + j5 + 5}{j10 + j5} + \frac{10}{j10} \cdot \frac{5 + 10 - j20 + j5}{j10 + j5} - j5 \right) = U_g$$

$$I_3 \left(5 + \frac{5(5 - j5) + j10(5 - j5) - j5}{j15} \right) = 100V$$

$$I_3 \left(\frac{j75 + 25 - j25 + 50 + j50 + 75}{j15} \right) = 100V$$

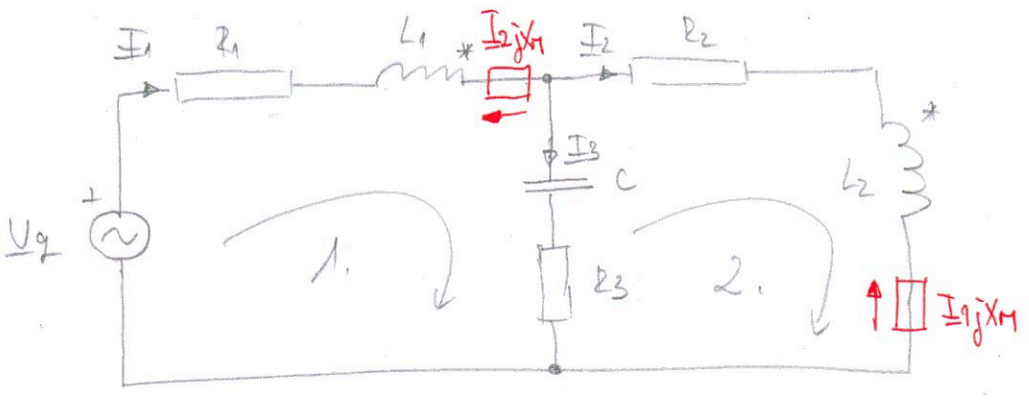
$$I_3 = \frac{j1500}{150 + j100} = 4,615 + j6,923 \text{ A}$$

$$\Rightarrow I_2 = \frac{I_3 \cdot (5 - j5)}{j15} = I_3 \cdot \frac{-75 + j75}{225} = 0,769 - j3,846 \text{ A}$$



$$I_1 = 5,384 + j3,077 \text{ A}$$

37. ZB. NAL.



$U_g = 100V$
 $R_1 = R_2 = R_3 = 10\Omega$
 $X_{L1} = 10\Omega$
 $X_{L2} = 20\Omega$
 $X_C = 5\Omega$
 $X_M = 4\Omega$

$$\begin{aligned}
 1) \quad & \underline{I}_1 (R_1 + jX_{L1}) - \underline{I}_2 jX_M + \underline{I}_3 (R_3 - jX_C) = U_g \quad (1) \\
 2) \quad & -\underline{I}_1 jX_M + \underline{I}_2 (R_2 + jX_{L2}) - \underline{I}_3 (R_3 - jX_C) = 0 \quad (2) \\
 & + \underline{I}_1 = \underline{I}_2 + \underline{I}_3 \quad (3) \\
 & \underline{I}_3 = \frac{\underline{I}_2 (R_2 + jX_{L2}) - \underline{I}_1 jX_M}{R_3 - jX_C} \quad (4)
 \end{aligned}$$

$$\underline{I}_1 (R_1 + jX_{L1} - jX_M) + \underline{I}_2 (R_2 + jX_{L2} - jX_M) = U_g$$

$$\underline{I}_2 \left(\frac{(R_3 + R_2 + jX_{L2} - jX_C) \cdot (R_1 + jX_{L1} - jX_M)}{R_3 + jX_M - jX_C} + R_2 + jX_{L2} - jX_M \right) = U_g$$

$$\begin{aligned}
 \underline{I}_1 (R_3 - jX_C + jX_M) &= \underline{I}_2 (R_3 - jX_C + R_2 + jX_{L2}) \\
 \underline{I}_1 &= \underline{I}_2 \frac{R_3 + R_2 + jX_{L2} - jX_C}{R_3 + jX_M - jX_C}
 \end{aligned}$$

$$\underline{I}_2 \left(\frac{(20 + j15) \cdot (10 + j6)}{10 - j1} + 10 + j16 \right) = 100V$$

$$\underline{I}_2 \left(\frac{200 + j170 + j150 - 90 + 100 + j160 - j10 + 16}{10 - j1} \right) = 100V$$

$$\underline{I}_2 \left(\frac{226 + j420}{10 - j1} \right) = 100V$$

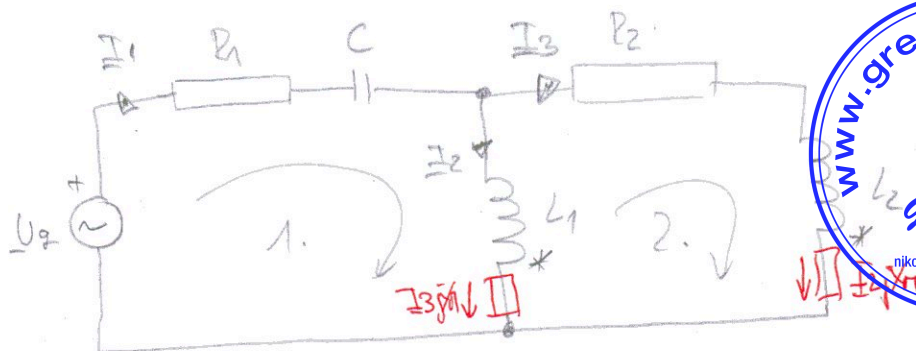
$$\underline{I}_2 = \frac{1000 - j100}{226 + j420} = \frac{(1000 - j100)(226 - j420)}{226^2 + 420^2} = \frac{226000 - j426000}{51076 + 176400}$$

$$\underline{I}_2 = \underline{0,809 - j1,946A} \quad \rightarrow \quad \underline{I}_1 = \underline{I}_2 \frac{20 + j15}{10 - j1} = \underline{185 + j170} / 101$$

$$\underline{I}_3 = \underline{3,948 - 0,257A}$$

$$\underline{I}_1 = \underline{4,757 - j2,202A}$$

38. ZBI. UAL.



$U_g = 100V$

$R_1 = R_2 = 5\Omega$

$X_L = X_{L2} = 10\Omega$

$X_C = 20\Omega$

$X_M = 5\Omega$

1.) $I_1 (R_1 - jX_C) + I_2 jX_{L1} + I_3 jX_M = U_g$

$I_1 = I_2 + I_3$

2.) $I_3 (R_2 + jX_{L2} - jX_M) + I_2 (jX_M - jX_{L1}) = 0$

$$I_3 = \frac{-I_2 (jX_M - jX_{L1})}{R_2 + jX_{L2} - jX_M}$$

$$I_1 = I_2 \left(1 - \frac{jX_M - jX_{L1}}{R_2 + jX_{L2} - jX_M} \right)$$

$$I_2 \left(R_1 - jX_C - \frac{(jX_M - jX_{L1}) \cdot (R_1 - jX_C)}{R_2 + jX_{L2} - jX_M} + jX_{L1} - \frac{jX_M (jX_M - jX_{L1})}{R_2 + jX_{L2} - jX_M} \right) = U_g$$

$$I_2 \left(5 - j20 - \frac{-j25 + 100}{5 + j5} + j10 - \frac{25}{5 + j5} \right) = 100$$

$$I_2 \left(5 - j20 + \frac{j25 + 100 + j50 - 25 - 50}{5 + j5} \right) = 100 \quad \boxed{I_3 = j3,33 \text{ A}}$$

$$I_2 \left(5 - j20 + \frac{25 + j75}{5 + j5} \right) = 100 \Rightarrow I_2 = \frac{100}{15 - j15} = \boxed{3,33 + j3,33 \text{ A}}$$

$$\Rightarrow I_1 = I_2 \cdot \left(1 - \frac{-j5}{5 + j5} \right) = \boxed{3,33 + j6,66 \text{ A}}$$