

Exemplo malhas independentes

1. Calcule as correntes do circuito abaixo aplicando o método de malhas independentes. Verifique o balanço de potências.

$$\bar{E}_3 = 16V; \bar{J}_2 = 0,25 \angle -90^\circ A,$$

$$\text{Dados: } \bar{J}_6 = 0,6 A; R_1 = 50 \Omega;$$

$$R_3 = 40 \Omega; X_4 = 20 \Omega; X_5 = 20 \Omega;$$

$$n_{eq} = r - r_C - N + 1 = 1$$

$$\bar{I}_A (R_1 + R_3 + jX_4 - jX_5) + \bar{J}_2 (R_1 + jX_4) + \bar{J}_6 j(X_4 - X_5) = \bar{E}_3$$

$$\bar{I}_A = \frac{\bar{E}_3 - \bar{J}_2 (R_1 + jX_4) - \bar{J}_6 j(X_4 - X_5)}{R_1 + R_3 + jX_4 - jX_5} = 0,185 \angle 48,65^\circ A$$

$$\bar{I}_1 = \bar{I}_A + \bar{J}_2 = 0,165 \angle -42,28^\circ A$$

$$\bar{I}_3 = \bar{I}_A = 0,185 \angle 48,65^\circ A$$

$$\bar{I}_4 = \bar{I}_A + \bar{J}_2 + \bar{J}_6 = 0,722 + j0,111 = 0,73 \angle -8,73^\circ A$$

$$\bar{I}_5 = \bar{I}_A + \bar{J}_6 = 0,735 \angle 10,88^\circ A$$

$$\bar{U}_{J6} - \bar{I}_4 jX_4 - \bar{I}_5 (-jX_5) = 0 \rightarrow \bar{U}_{J6} = \bar{I}_4 jX_4 - \bar{I}_5 (jX_5)$$

$$\rightarrow \bar{U}_{J6} = 4,99V$$

$$\bar{U}_{J2} - \bar{I}_1 R_1 - \bar{I}_4 jX_4 = 0 \rightarrow \bar{U}_{J2} = \bar{I}_1 R_1 + \bar{I}_4 jX_4$$

$$\rightarrow \bar{U}_{J2} = 12,17 \angle 46,87^\circ V$$

$$\bar{S}_f = \bar{E}_3 \bar{I}_3^* + \bar{U}_{J2} \bar{J}_2^* + \bar{U}_{J6} \bar{J}_6^* = (2,73 - j0,14) VA$$

$$P_{CONS} = I_1^2 R_1 + I_3^2 R_3 = 2,73W$$

$$Q_{CONS} = I_4^2 X_4 - I_5^2 X_5 = -0,15 VAR$$

