

TEORIA DE CIRCUITOS
EXEMPLOS DE MÉTODOS DE CÁLCULO DE CIRCUITOS DE CA

1. Calcular as correntes do circuito dado, aplicando o método de correntes de sobreposição. Verificar o equilíbrio de potências.

$$R_1 = 2\Omega, R_3 = 3\Omega, \bar{E}_1 = j10V,$$

$$\bar{E}_2 = j10V, X_2 = 4\Omega, X_3 = 4\Omega$$

$$\bar{Z}_{EQ1} = \frac{jX_2(R_3 + jX_3)}{R_3 + j(X_2 + X_3)} + R_1 = 3,48\angle 40,21^\circ \Omega$$

$$\bar{I}'_1 = \frac{\bar{E}_1}{\bar{Z}_{EQ1}} = 2,87\angle 49,79^\circ A$$

$$\bar{I}'_3 = \bar{I}'_1 \frac{jX_2}{R_3 + j(X_2 + X_3)} = 1,34\angle 70,35^\circ A \quad \bar{I}'_2 = \bar{I}'_3 - \bar{I}'_1 = 1,68\angle -146,45^\circ A$$

$$\bar{Z}_{EQ2} = \frac{R_1(R_3 + jX_3)}{R_3 + R_1 + jX_3} + jX_2 = 4,64\angle 71^\circ \Omega \quad \bar{I}''_2 = \frac{\bar{E}_2}{\bar{Z}_{EQ2}} = 2,15\angle 19^\circ A$$

$$\bar{I}''_3 = \bar{I}''_2 \frac{R_1}{R_3 + R_1 + jX_3} = 0,67\angle -19,66^\circ A \quad \bar{I}''_1 = \bar{I}'_3 - \bar{I}''_2 = 1,68\angle -146,57^\circ A$$

$$\bar{I}_1 = \bar{I}'_1 + \bar{I}''_1 = 1,34\angle 70,4^\circ A \quad \bar{I}_2 = \bar{I}'_2 + \bar{I}''_2 = 0,67\angle -19,86^\circ A$$

$$\bar{I}_3 = \bar{I}'_3 + \bar{I}''_3 = 1,5\angle 43,78^\circ A$$

$$\bar{S}_F = \bar{E}_1 \bar{I}_1^* + \bar{E}_2 \bar{I}_2^* = j10(1,34\angle -70,4 + 0,67\angle 19,86) = (10,35 + j10,8) VA$$

$$P_C = I_1^2 R_1 + I_3^2 R_3 = (1,34)^2 \cdot 2 + (1,5)^2 \cdot 3 = 10,34W$$

$$Q_C = I_2^2 X_2 + I_3^2 X_3 = 4 \cdot ((0,67)^2 + (1,5)^2) = 10,8 VAR$$

