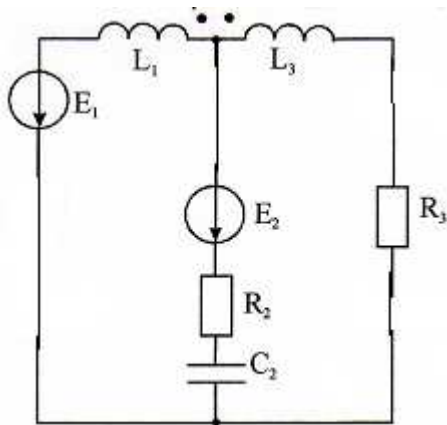


$$j := \sqrt{-1} \quad E1 := 141 \cdot e^{j \cdot 60 \cdot \frac{\pi}{180}} \quad E2 := 169$$

$$f := 500 \quad L1 := 160 \cdot 10^{-3} \quad R2 := 25 \cdot 10^{-6} \quad R3 := 82 \quad L3 := 68 \cdot 10^{-3}$$

$$M := 35 \cdot 10^{-3} \quad \omega := 2\pi \cdot f = 3.142 \times 10^3 \quad C2 := 20 \cdot 10^{-6}$$



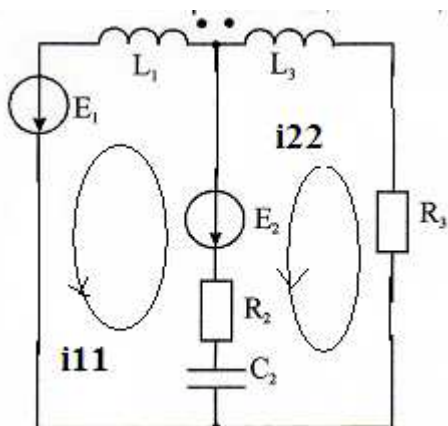
Уравнения по закону Кирхгофа

$$E1 - E2 = I1 \cdot j \cdot \omega \cdot (L1 - M) - I2 \cdot \left(\frac{1}{j \cdot \omega \cdot C2} + R2 \right)$$

$$E2 = I3 \cdot (R3 + j \cdot \omega \cdot (L3 - M)) + I2 \cdot \left(\frac{1}{j \cdot \omega \cdot C2} + R2 \right)$$

$$I1 - I3 + I2 = 0$$

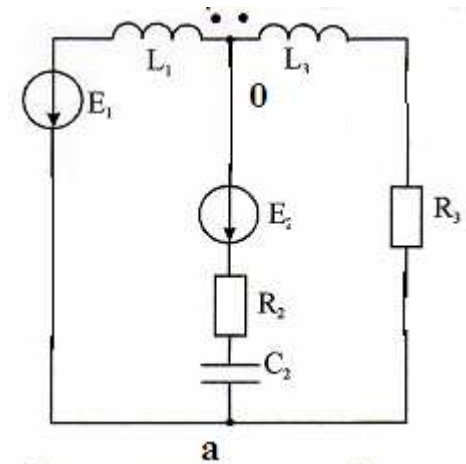
По методу контурных токов



$$E_1 - E_2 = i_{11} \cdot \left[j \cdot \omega \cdot (L_1 - M) + R_2 + \frac{1}{j \cdot \omega \cdot C_2} \right] + i_{22} \cdot \left(\frac{1}{j \cdot \omega \cdot C_2} + R_2 \right)$$

$$E_2 = i_{11} \cdot \left(\frac{1}{j \cdot \omega \cdot C_2} + R_2 \right) + i_{22} \cdot \left[R_3 + R_2 + j \cdot \omega \cdot (L_3 - M) + \frac{1}{j \cdot \omega \cdot C_2} \right]$$

Методу узловых потенциалов



$$\varphi_a := \frac{\frac{-E_1}{j \cdot \omega \cdot (L_1 + M)} + \frac{-E_2}{R_2 + \frac{1}{j \cdot \omega \cdot C_2}}}{\frac{1}{[j \cdot \omega \cdot (L_1 + M)]} + \frac{1}{R_2 + \frac{1}{j \cdot \omega \cdot C_2}} + \frac{1}{R_3 + j \cdot \omega \cdot (L_3 - M)}}$$

Метод активного двухполюсника

Найдем ток I1

$$I_x := \frac{E_2}{R_2 + \frac{1}{j \cdot \omega \cdot C_2} + [R_3 + j \cdot \omega \cdot (L_3 - M)]} = 0.961 - 1.028i$$

$$U_x := I_x \cdot [R_3 + j \cdot \omega \cdot (L_3 - M)] = 185.363 + 15.29i$$

$$Z_x := \frac{\left(R_2 + \frac{1}{j \cdot \omega \cdot C_2} \right) \cdot [R_3 + j \cdot \omega \cdot (L_3 - M)]}{R_2 + \frac{1}{j \cdot \omega \cdot C_2} + [R_3 + j \cdot \omega \cdot (L_3 - M)]} = 1.44 - 17.456i$$

$$I_1 := \frac{E_1 - U_x}{j \cdot \omega \cdot (L_1 - M) + Z_x} = 0.283 + 0.307i$$

Найдем ток I2

$$I_x := \frac{E1}{j \cdot w \cdot (L1 - M) + R3 + j \cdot w \cdot (L3 - M)} = 0.262 - 0.099i$$

$$U_x := I_x \cdot [R3 + j \cdot w \cdot (L3 - M)] = 31.742 + 19.101i$$

$$Z_x := \frac{[R3 + j \cdot w \cdot (L3 - M)] \cdot [j \cdot w \cdot (L1 - M)]}{R3 + j \cdot w \cdot (L3 - M) + j \cdot w \cdot (L1 - M)} = 49.96 + 90.273i$$

$$I2 := \frac{E2 - U_x}{R2 + \frac{1}{j \cdot w \cdot C2} + Z_x} = 0.678 - 1.391i$$

Найдем ток I3

$$I_x := \frac{E1 - E2}{R2 + \frac{1}{j \cdot w \cdot C2} + j \cdot w \cdot (L1 - M)} = 0.324 + 0.261i$$

$$U_x := E1 - I_x \cdot [j \cdot w \cdot (L1 - M)] = 173.161 - 5.158i$$

$$Z_x := \frac{\left(R2 + \frac{1}{j \cdot w \cdot C2} \right) \cdot [j \cdot w \cdot (L1 - M)]}{j \cdot w \cdot (L1 - M) + \left(R2 + \frac{1}{j \cdot w \cdot C2} \right)} = 2.716 \times 10^{-5} - 16.588i$$

$$I3 := \frac{U_x}{R3 + j \cdot w \cdot (L3 - M) + Z_x} = 0.961 - 1.084i$$

$$I2 + I1 = 0.961 - 1.084i$$

$$I3 = 0.961 - 1.084i$$