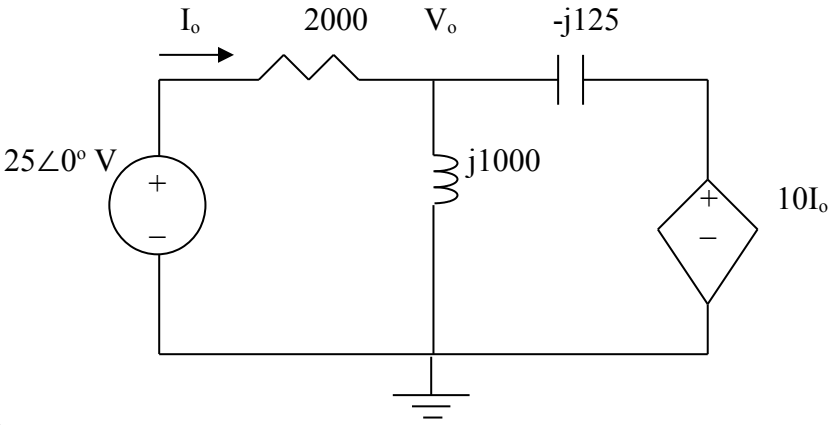
Chapter 10, Solution 5.

$$0.25H \longrightarrow j\omega L = j0.25x4x10^3 = j1000$$

$$2\mu F \longrightarrow 1/j\omega C = \frac{1}{j4x10^3 x2x10^{-6}} = -j125$$

Consider the circuit as shown below.



At node V_o,

$$\frac{V_o - 25}{2000} + \frac{V_o - 0}{j1000} + \frac{V_o - 10I_o}{-j125} = 0$$

$$V_o - 25 - j2V_o + j16V_o - j160I_o = 0$$

$$(1 + j14)V_o - j160I_o = 25$$

But $I_o = (25 - V_o)/2000$

$$(1 + j14)V_o - j2 + j0.08V_o = 25$$

$$V_o = \frac{25 + j2}{1 + j14.08} = \frac{25.08\angle 4.57^\circ}{14.115\angle 58.94^\circ} 1.7768\angle -81.37^\circ$$

Now to solve for i_o,

$$I_o = \frac{25 - V_o}{2000} = \frac{25 - 0.2666 + j1.7567}{2000} = 12.367 + j0.8784\,\text{mA}$$

$$= 12.398\angle 4.06^\circ$$

$$i_o = \mathbf{12.398\cos(4x10^3t + 4.06^\circ)\ mA}.$$