Answer on Question #51520, Physics, Electromagnetism

an ac circuit consist of a voltage source v = 200sin120piet and a 6uf capacitor in series. calculate the current established in the circuit

a) 0.32A

b) 1.24A

c) 0.64A

d) 2.13A

Solution

We represent the voltage in complex form

$$\dot{U} = \frac{120}{\sqrt{2}} \text{V} \tag{1}$$

The resistance of the capacitor is given by Eq.(2)

$$Z = -jX_C = -j\frac{1}{\omega C} = -j\frac{1}{120\pi \cdot 6 \cdot 10^{-6}} \approx -442 j \, \text{Om} \tag{2}$$

The current established in the circuit is given by Eq.(3)

$$I = \left|\frac{\dot{U}}{Z}\right| = \left|\frac{200 / \sqrt{2}}{-442 j}\right| \approx 0.32A \tag{3}$$

Answer: a) 0.32A