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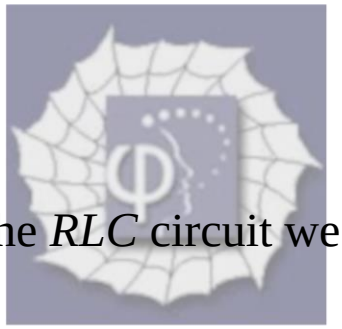
Problem 39.17 (RHK)

For a certain RLC circuit the maximum generator emf is 125 V *and the maximum current is* 3.20 A. *If the current leads the generator emf by* 56.3^0, (a) *we have to find the impedance,* (b) *the resistance of the circuit.* (c) *We have to answer whether the circuit is predominantly capacitive or inductive*.



Solution:

From the data of the *RLC* circuit we note that

$\mathrm{E}_m = 125 \text{ V}$,

and

$i_m = 3.2 \text{ A}.$

Therefore, the impedance of the circuit

$$Z = \frac{\mathrm{E}_m}{i_m} = \frac{125}{3.2} \ \Omega = 39.06 \ \Omega.$$

It is given that the current leads the generator emf by

$\phi = 56.3^0$.

As

$$\cos\phi = \frac{R}{Z},$$

$$R = 39.06 \times \cos\left(56.3^0\right)\ \Omega = 21.7\ \Omega.$$

As the current is leading the emf the circuit is predominantly capacitive.