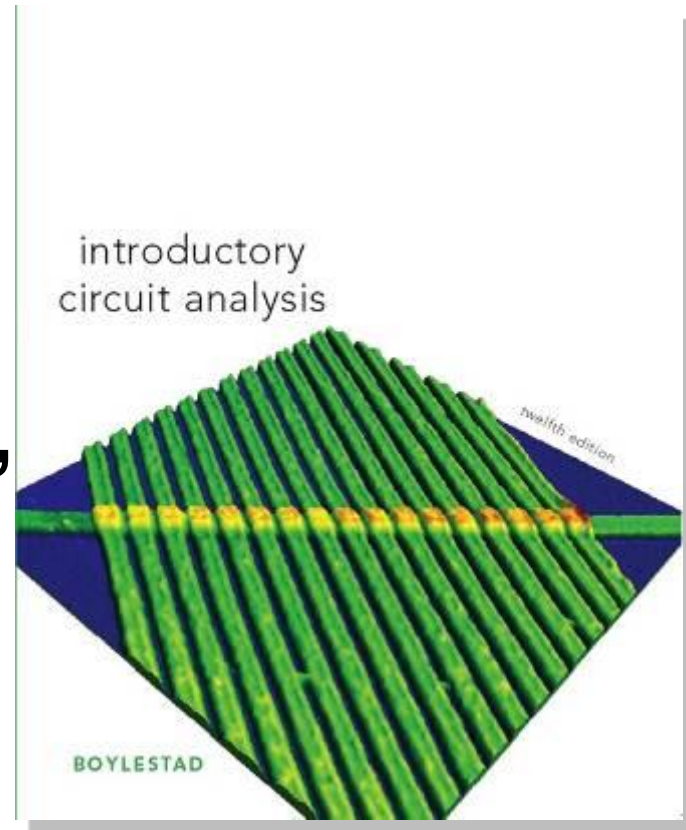# Chapter 14

The Basic Elements and Phasors, power, impedance

OBJECTIVES

- Become familiar with the response of a resistor, an inductor, and a capacitor to the application of a sinusoidal voltage or current.
- Learn impedance
- Understand how to calculate power B

DERIVATIVE

- To understand the response of the basic *R*, *L*, and *C* elements to a sinusoidal signal, you need to examine the concept of the **derivative** in some detail.

RESPONSE OF BASIC R, L, AND C ELEMENTS TO A SINUSOIDAL VOLTAGE OR CURRENT

- **Resistor**
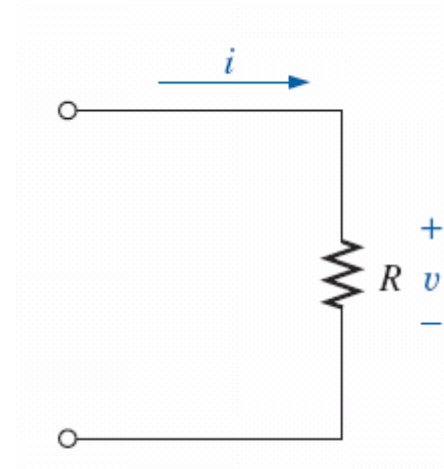- **Inductor**
- **Capacitor**

FIG. 14.4 *Determining the sinusoidal response for a resistive element.*

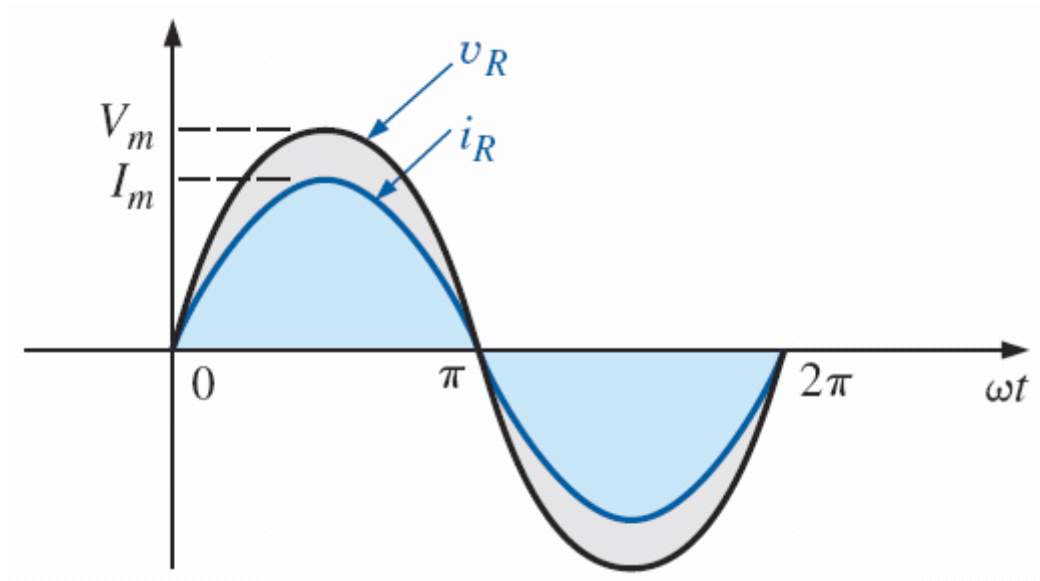# RESPONSE OF BASIC R, L, AND C ELEMENTS TO A SINUSOIDAL VOLTAGE OR CURRENT

FIG. 14.5 *The voltage and current of a resistive element are in phase.*

RESPONSE OF BASIC R, L, AND C ELEMENTS TO A SINUSOIDAL VOLTAGE OR CURRENT
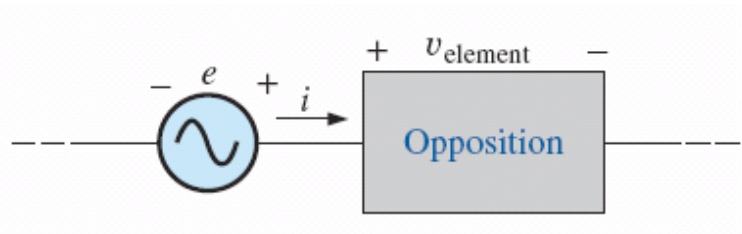

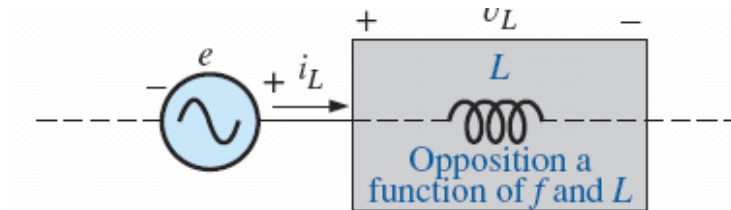**FIG. 14.6** *Defining the opposition of an element to the flow of charge through the element.*

FIG. 14.7 *Defining the parameters that determine the opposition of an inductive element to the flow of charge.*

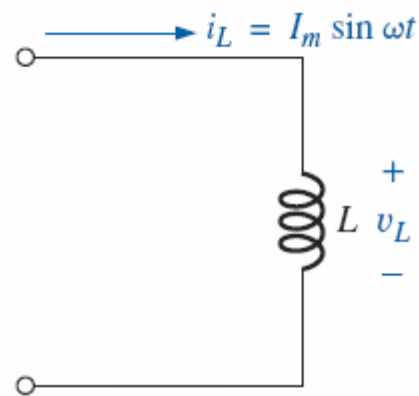# RESPONSE OF BASIC R, L, AND C ELEMENTS TO A SINUSOIDAL VOLTAGE OR CURRENT

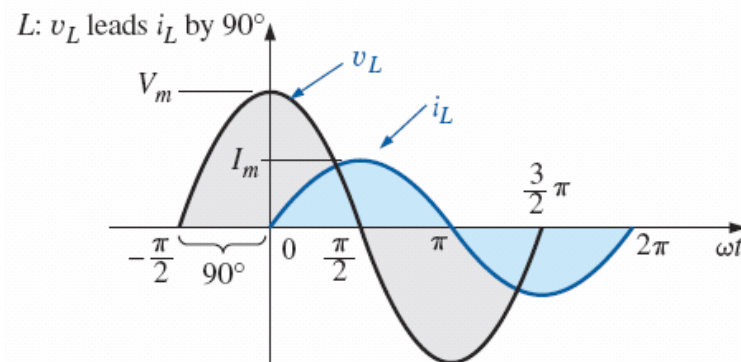**FIG. 14.8** *Investigating the sinusoidal response of an inductive element.*

FIG. 14.9 *For a pure inductor, the voltage across the coil leads the current through the coil by 90°.*

RESPONSE OF BASIC R, L, AND C ELEMENTS TO A SINUSOIDAL VOLTAGE OR CURRENT
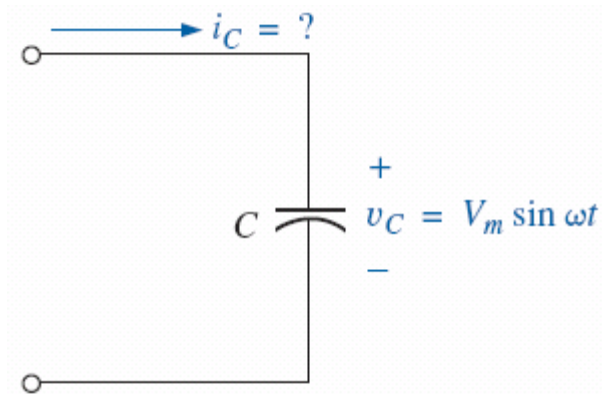

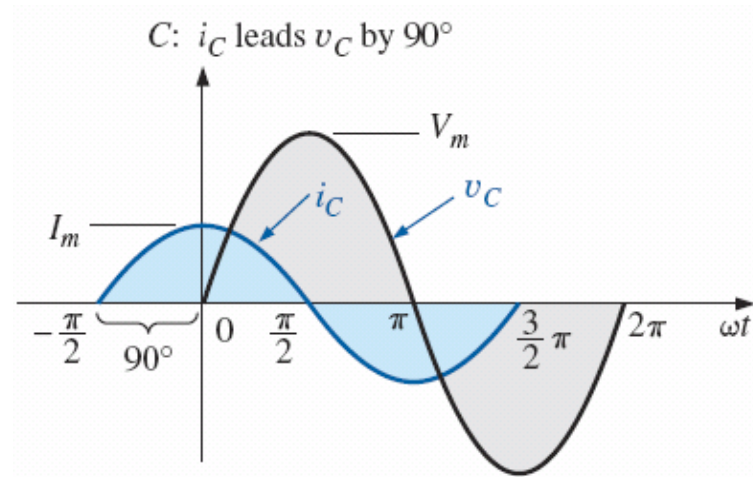FIG. 14.11 *Investigating the sinusoidal response of a capacitive element.*

FIG. 14.12 *The current of a purely capacitive element leads the voltage across the element by 90°.*