

**Reading Assignment:** Chapter 8 in Electric Circuits, 9<sup>th</sup> Ed. by Nilsson

### Series and Parallel RLC Circuits

Two common second-order circuits are now considered:

- *series RLC circuits*
- *parallel RLC circuits.*

Relationships for these circuits can be easily developed such that the characteristic equation can be determined directly from component values without writing a differential equation for each example.

A general 2nd-order characteristic equation has the form:  $\frac{d^2x}{dt^2} + 2\alpha \frac{dx}{dt} + \omega_o^2 x(t) = f(t)$

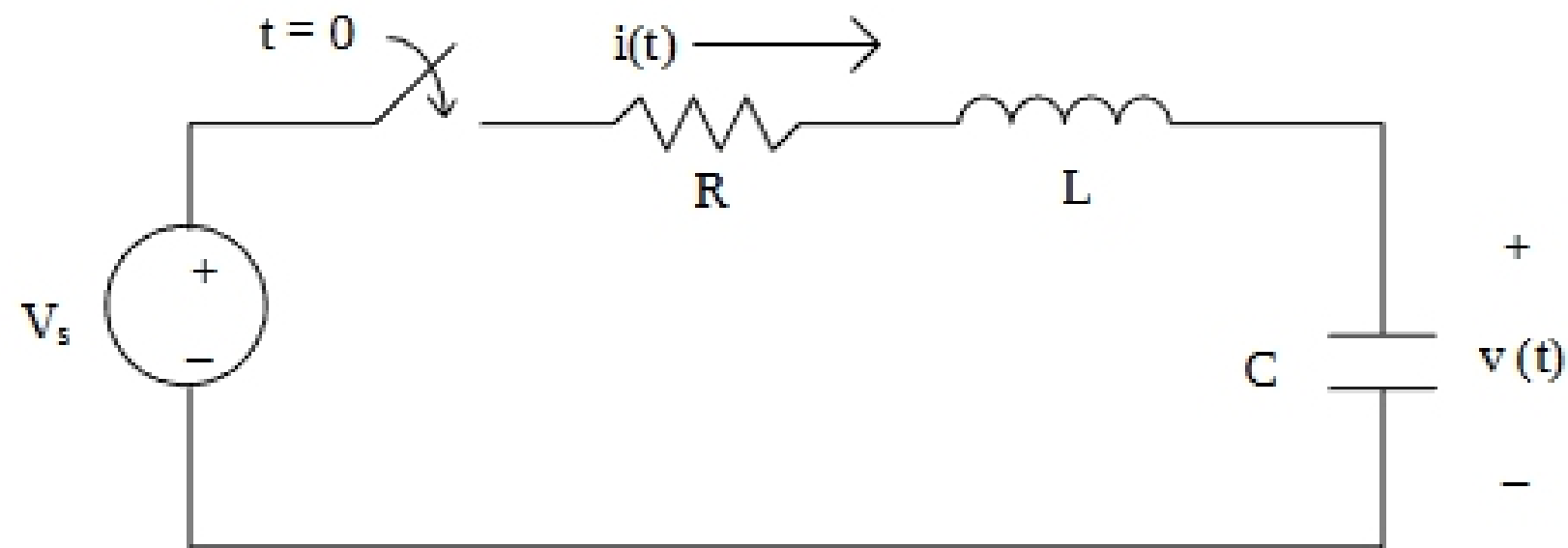
A general 2nd-order characteristic equation has the form:  $s^2 + 2\alpha s + \omega_o^2 = 0$

where

$\alpha$  = damping coefficient

$\omega_o$  = resonant frequency

**Series RLC Circuit** - develop expressions for  $\alpha$  and  $\omega_0$



**Parallel RLC Circuit** - develop expressions for  $\alpha$  and  $\omega_0$

