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Introduction to Electronics

An introduction to electronic components and a study of circuits containing such devices.

TECH



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Review of Impedance

Review of Impedance for Analyzing AC Circuits



TECH

Previous Lesson

- ⦿ Review of Kirchhoff's Laws

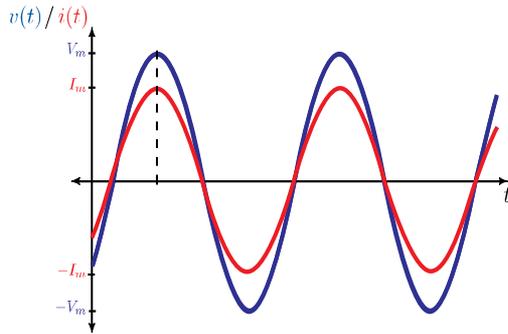
Lesson Objectives

- ⦿ Review
 - Impedances for steady-state sinusoidal inputs (AC)

Impedances

$$R$$


$$Z_R = R$$

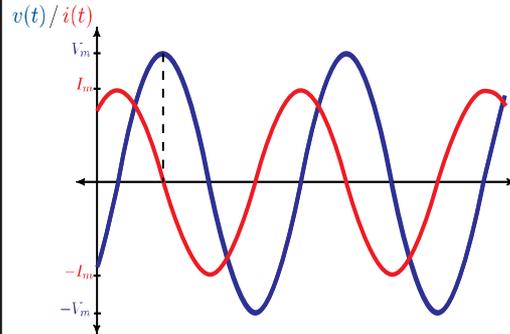


In-phase

Frequency invariant

$$C$$

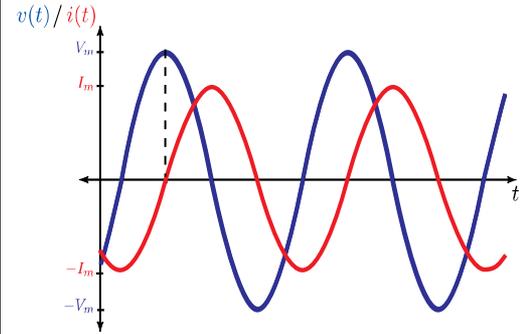

$$Z_C = \frac{1}{j\omega C}$$



Current leads voltage

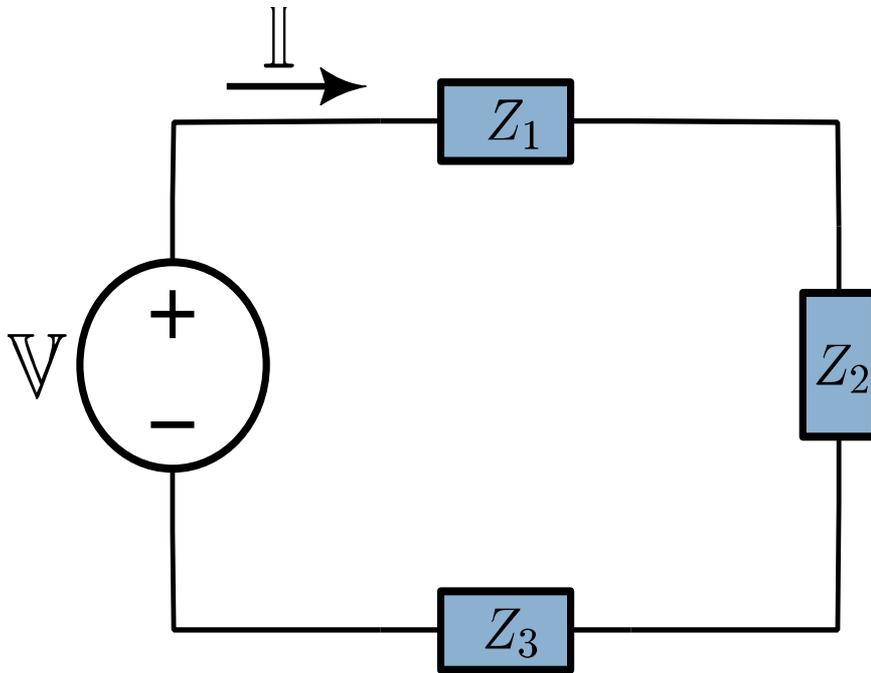
$$L$$


$$Z_L = j\omega L$$



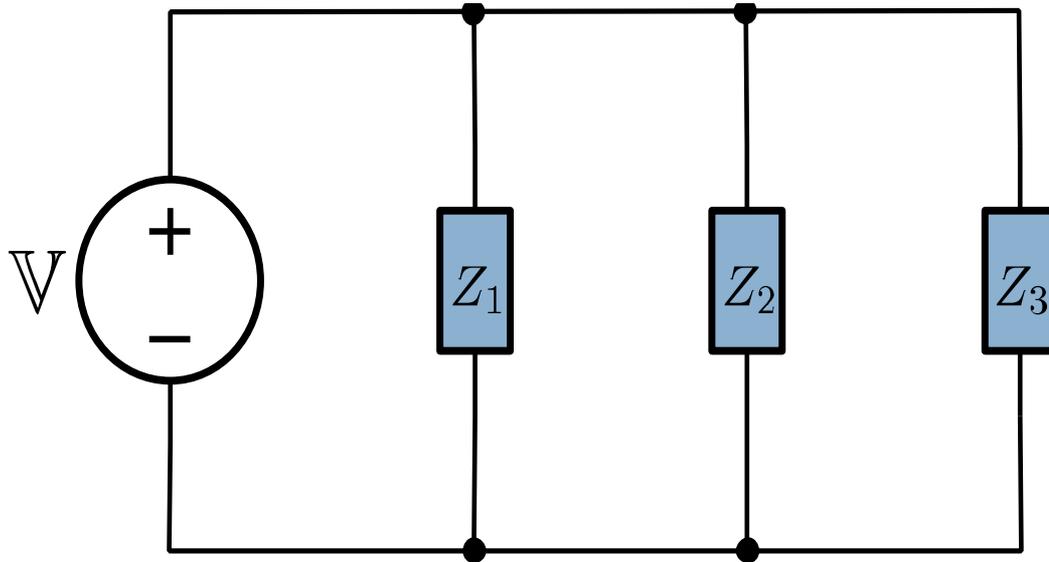
Current lags voltage

Impedances in Series



$$Z_{cq} = \sum_i Z_i$$

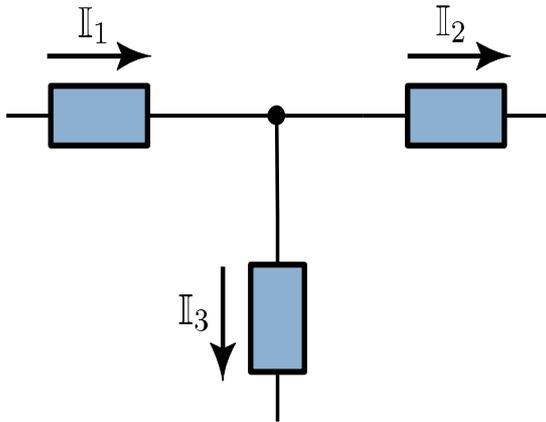
Impedances in Parallel



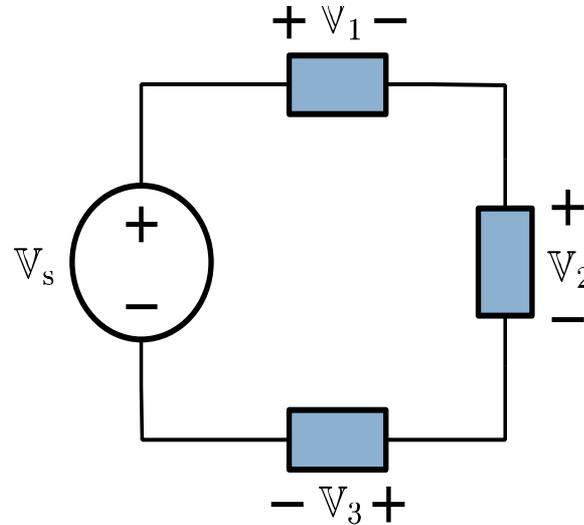
$$Z_{\text{eq}} = \left[\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} \right]^{-1}$$

$$Z_{\text{eq}} = \left[\sum_i \frac{1}{Z_i} \right]^{-1}$$

Kirchhoff's Laws

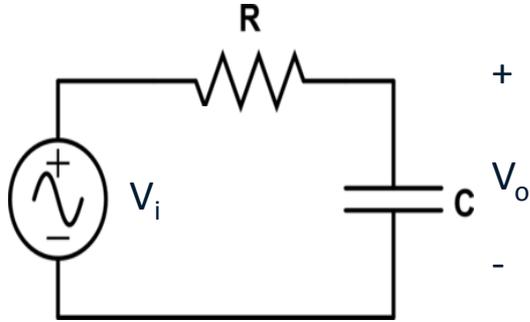


$$I_1 = I_2 + I_3$$

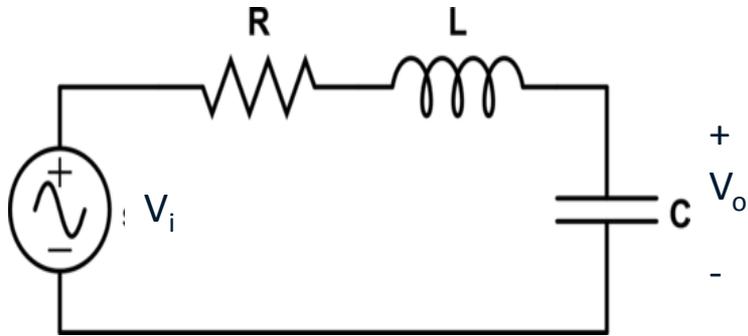


$$V_s = V_1 + V_2 + V_3$$

Series RC



Series RLC



Summary

- ⦿ Introduced KVL and KCL
- ⦿ Applied KVL to parallel elements
- ⦿ Applied KCL to series elements
- ⦿ Solved a simple circuit using
Kirchhoff's Laws

Next Lesson

- Review of Transfer Functions