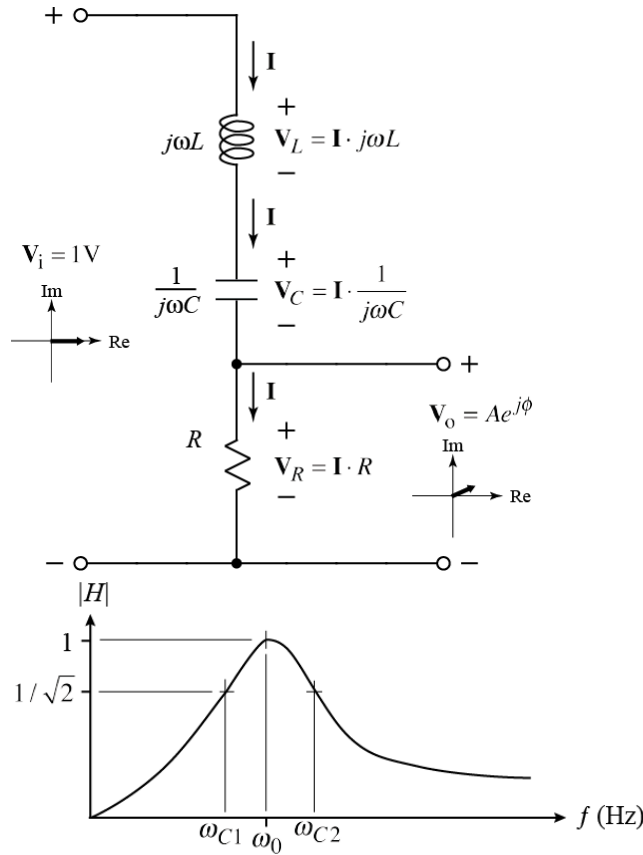


SUMMARY: The RLC band-pass filter is characterized by its gain.



The gain is the ratio of the magnitude of the output to the magnitude of the input.

$$\text{gain} \equiv |H| \equiv \left| \frac{\mathbf{V}_o}{\mathbf{V}_i} \right| = \frac{1}{\left| 1 + j \frac{1}{R} \left(\omega L - \frac{1}{\omega C} \right) \right|} = \frac{1}{\sqrt{1 + \left[\frac{1}{R} \left(\omega L - \frac{1}{\omega C} \right) \right]^2}}$$

The center frequency is where the gain of the filter is at its maximum.

$$\text{gain at } \omega_0 = 1 = \frac{1}{|1|}$$

The bandwidth is the difference between frequencies where the gain is $1/\sqrt{2}$ times the maximum gain.

$$\text{cutoff frequencies} \equiv \omega_{C1}, \omega_{C2} \equiv \text{where gain} = \frac{1}{\sqrt{2}} = \frac{1}{|1 \pm j|}$$

$$\text{bandwidth} \equiv \beta \equiv \omega_{C2} - \omega_{C1}$$

Note: $\omega = 2\pi f$