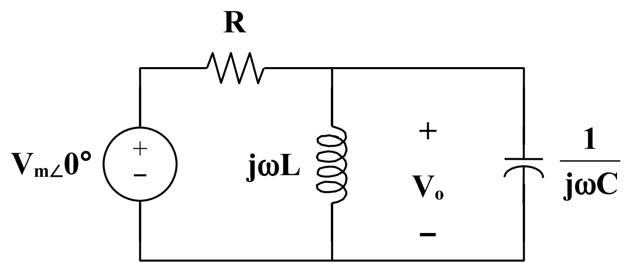
Chapter 10, Solution 20.

The circuit is converted to its frequency-domain equivalent circuit as shown below.



Let $\mathbf{Z} = j\omega L \parallel \frac{1}{j\omega C} = \frac{\frac{L}{C}}{j\omega L + \frac{1}{j\omega C}} = \frac{j\omega L}{1-\omega^2 LC}$

$$\mathbf{V}_o = \frac{\mathbf{Z}}{R+\mathbf{Z}}V_m = \frac{\frac{j\omega L}{1-\omega^2 LC}}{R + \frac{j\omega L}{1-\omega^2 LC}}V_m = \frac{j\omega L}{R(1-\omega^2 LC) + j\omega L}V_m$$

$$\mathbf{V}_o = \frac{\omega L\, V_m}{\sqrt{R^2 (1-\omega^2 LC)^2 + \omega^2 L^2}}\angle\left(90° - \tan^{-1}\frac{\omega L}{R(1-\omega^2 LC)}\right)$$

If $\mathbf{V}_o = A\angle\phi$, then

$$A = \frac{\boldsymbol{\omega} \mathbf{L}\, \mathbf{V}_m}{\sqrt{\mathbf{R}^2 (\mathbf{1}-\boldsymbol{\omega}^2\mathbf{LC})^2 + \boldsymbol{\omega}^2\mathbf{L}^2}}$$

and $\phi = \mathbf{90° - tan^{-1}} \frac{\boldsymbol{\omega}\mathbf{L}}{\mathbf{R}(\mathbf{1}-\boldsymbol{\omega}^2\mathbf{LC})}$