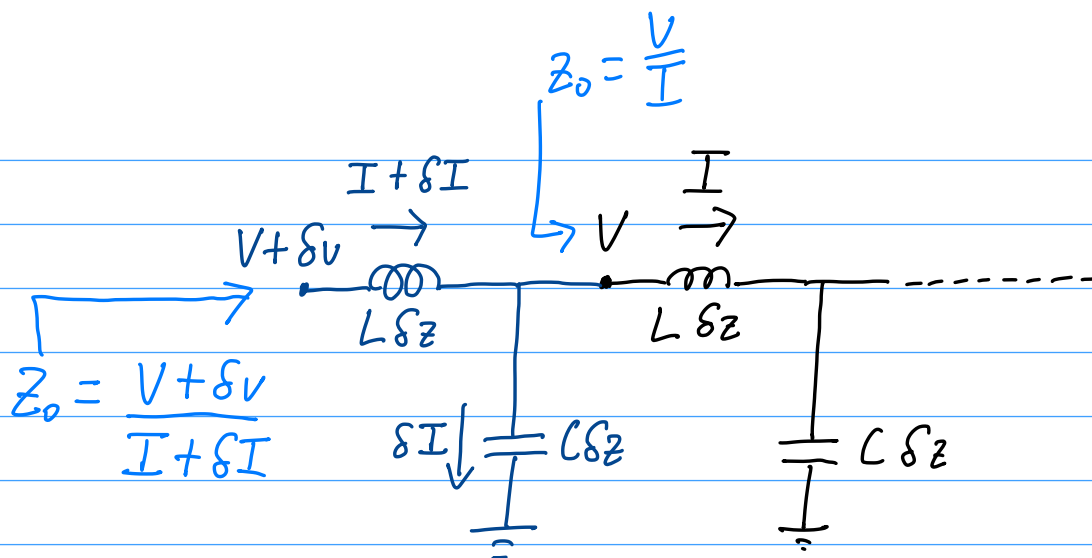




$$(a) \quad Z_c = \frac{1}{j\omega C \delta z} \quad \therefore \delta I = \frac{V}{Z_c} = j\omega C \delta z V$$

$$(b) \quad Z_L = j\omega L \delta z \quad \therefore \delta V = (I + \delta I) Z_L$$

$$= I j\omega L \delta z + \cancel{\delta I j\omega L \delta z} \quad \delta I \delta z \approx 0$$

$$(c) \quad Z_0 = \frac{V + \delta V}{I + \delta I} = \frac{V}{I}$$

$$\frac{V + j\omega L \delta z I}{I + j\omega C \delta z V} = \frac{V}{I}$$

Cross-multiply

$$\cancel{VI} + j\omega L \delta z I^2 = \cancel{VI} + j\omega C \delta z V^2$$

$$\frac{\cancel{j\omega L \delta z} I^2}{\cancel{j\omega C \delta z}} = \frac{V^2}{I^2} = Z_0^2$$

$$\therefore Z_0 = \sqrt{\frac{L}{C}}$$