$$\begin{cases} V(z) = V_{i0} e^{-\gamma z} + V_{r0} e^{\gamma z} \\ Z_0 \times I(z) = \dfrac{V_{i0}}{\cancel{Z_0}} e^{-\gamma z} - \dfrac{V_{r0}}{\cancel{Z_0}} e^{\gamma z} \end{cases}$$

$$I_L Z_L \ \cancel{V_L} \triangleq V(l) = V_{i0} e^{-\gamma l} + V_{r0} e^{\gamma l}$$

$$Z_0 \times I_L \triangleq I(l) = \frac{V_{i0}}{\cancel{Z_0}} e^{-\gamma l} - \frac{V_{r0}}{\cancel{Z_0}} e^{\gamma l}$$

$$\begin{cases} V_{i0} = \dfrac{I_L}{2}(Z_L + Z_0) e^{\gamma l} \\ V_{r0} = \dfrac{I_L}{2}(Z_L - Z_0) e^{-\gamma l} \end{cases}$$

代入

$$\Rightarrow \begin{cases} V(z) = \dfrac{I_L}{2}(Z_L + Z_0) e^{\gamma l} e^{-\gamma z} + \dfrac{I_L}{2}(Z_L - Z_0) e^{-\gamma l} e^{\gamma z} \\ I(z) = \dfrac{I_L}{2Z_0}(Z_L + Z_0) e^{\gamma l} e^{-\gamma z} - \dfrac{I_L}{2Z_0}(Z_L - Z_0) e^{-\gamma l} e^{\gamma z} \end{cases}$$

$$\begin{cases} V(z) = \dfrac{I_L}{2}(Z_L + Z_0) e^{\gamma(\overbrace{l-z}^{z'})} + \dfrac{I_L}{2}(Z_L - Z_0) e^{-\gamma(\overbrace{l-z}^{z'})} \\ I(z) = \dfrac{I_L}{2Z_0}(Z_L + Z_0)^{\gamma(\overbrace{l-z}^{z'})} - \dfrac{I_L}{2Z_0}(Z_L - Z_0) e^{-\gamma(\overbrace{l-z}^{z'})} \end{cases}$$

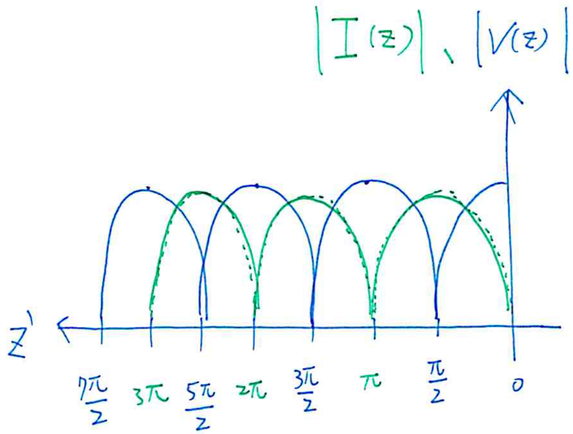
$$\begin{cases} V(z) = I_L \left(\dfrac{e^{\gamma z'} + e^{-\gamma z'}}{2} \right) Z_L + I_L \left(\dfrac{e^{\gamma z'} - e^{-\gamma z'}}{2} \right) Z_0 \\ I(z) = \dfrac{I_L}{Z_0} \left(\dfrac{e^{\gamma z'} - e^{-\gamma z'}}{2} \right) Z_L + \dfrac{I_L}{Z_0} \left(\dfrac{e^{\gamma z'} + e^{-\gamma z'}}{2} \right) Z_0 \end{cases}$$

$$\begin{cases} V(z) = \overset{V_L}{\cancel{I_L Z_L}} \cosh \gamma z' + I_L Z_0 \sinh \gamma z' \\ I(z) = \dfrac{\overset{V_L}{\cancel{I_L Z_L}}}{Z_0} \sinh \gamma z' + \dfrac{I_L \cancel{Z_0}}{\cancel{Z_0}} \cosh \gamma z' \end{cases} \Rightarrow \begin{cases} V(z) = V_L \cosh \gamma z' + I_L Z_0 \sinh \gamma z' \\ I(z) = I_L \cosh \gamma z' + \dfrac{V_L}{Z_0} \sinh \gamma z' \end{cases}$$

$$\begin{cases} V(z) = V_L \cos\beta z' + j I_L Z_0 \sin\beta z' \\ I(z) = I_L \cos\beta z' + j \dfrac{V_L}{Z_0} \sin\beta z' \end{cases}$$

當 $Z_L \to \infty$, $I_L \to 0$

$$\begin{cases} |V(z)| = |V_L| \times |\cos\beta z'| \\ |I(z)| = \left|\dfrac{V_L}{Z_0}\right| \times |\sin\beta z'| \end{cases}$$



當 $Z_L \to 0$, $V_L \to 0$

$$\begin{cases} |V(z)| = |I_L Z_0| \times |\sin\beta z'| \\ |I(z)| = |I_L| \times |\cos\beta z'| \end{cases}$$