Quals (2007)
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Solution

$$\frac{d^2V}{dz^2} = -R\frac{di}{dz} = +RGV$$

with $\alpha = \sqrt{RG}$

$$V = V_1 \exp -\alpha z + V_2 \exp +\alpha z$$

$$i = -\frac{1}{R}\frac{dV}{dz}; \quad \text{with} \quad \frac{\alpha}{R} = \sqrt{\frac{G}{R}} \equiv \frac{1}{Z_0}$$

$$i = \frac{V_1}{Z_0}\exp -\alpha z - \frac{V_2}{Z_0}\exp +\alpha z$$

$$Z_{in} \equiv \frac{V(-L)}{i(-L)}$$

— Use the b.c. at $z=0$ $\quad \frac{V(0)}{i(0)} = R_L$

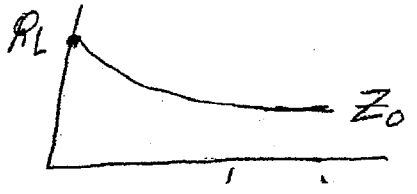
to find V_2/V_1;

with $R=G=1$ obtain

$$Z_{in} = \frac{R_L \cosh z - \sinh z}{\cosh z - R_L \sinh z}$$ ← Nobody got this far

= Question: Plot Z_{in} as a function of L with attention to $L \to \infty$

Answer



& $Z_{in} \to Z_0$ when