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SBE II: Homework 4

Experiment-4:

Given that we know the following:

$$\tilde{V}(x,s) = \frac{2I_0\lambda r_i}{s\sqrt{s+1}}\cosh(\sqrt{s+1}\frac{x}{\lambda})$$

We are asked to derive the equation of V for steady state (i.e. $t \to \infty$). This can be accomplished by applying the final value theorem.

$$V(s, t \to \infty) = \lim_{s\to 0} s\,\tilde{V}(x,s)$$
$$= \lim_{s\to 0} \frac{2I_0\lambda r_i}{\sqrt{s+1}}\cosh\left(\sqrt{s+1}\frac{x}{\lambda}\right)$$
$$V(x, t \to \infty) = 2I_0 r_i \lambda \cosh(\frac{x}{\lambda})$$