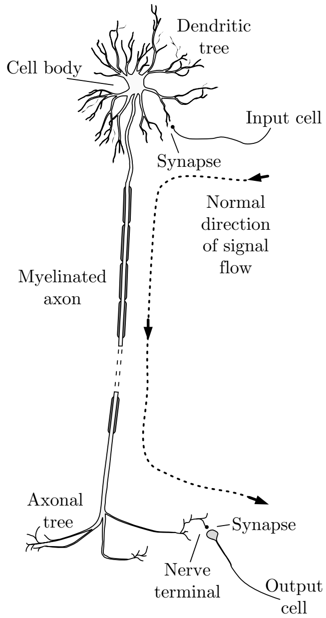


Figure 1.22

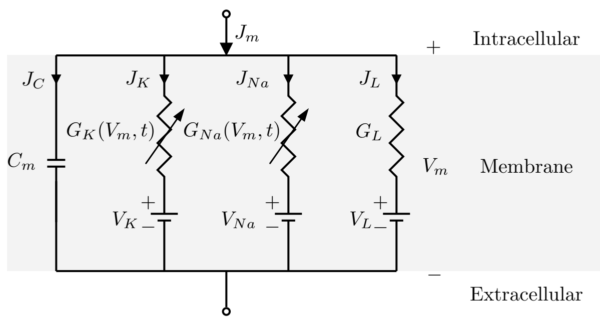
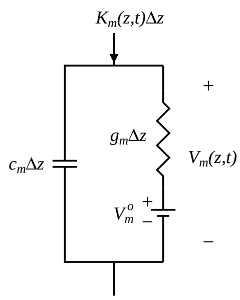
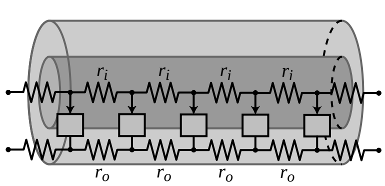


Figure 4.6



Core Conductor Model



Cable Equation

Let $v_m(z,t) = V_m(z,t) - V_m^o$ and $|v_m(z,t)| << |V_m^o|$:

$$\boxed{v_m(z,t) + \tau_M \frac{\partial v_m(z,t)}{\partial t} - \lambda_C^2 \frac{\partial^2 v_m(z,t)}{\partial z^2} = r_o \lambda_C^2 K_e(z,t)}$$

where

$$\lambda_C^2 = \frac{1}{g_m(r_o + r_i)}$$

$$\tau_M = \frac{c_m}{g_m}$$

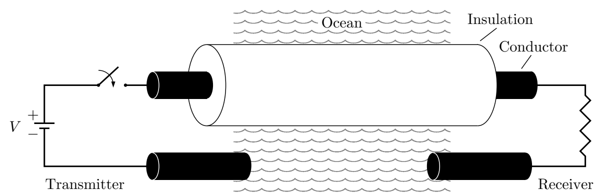


Figure 3.8

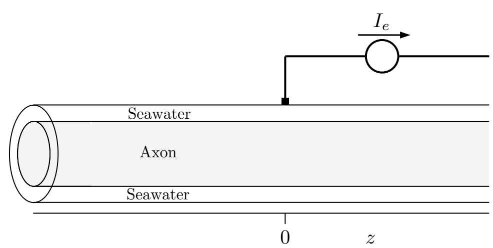


Figure 3.9

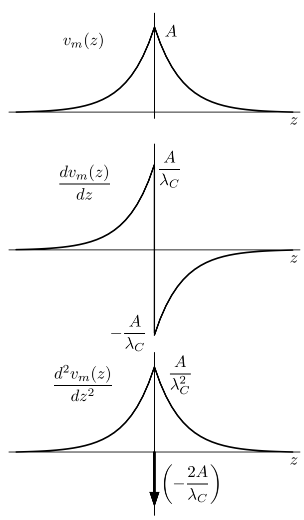


Figure 3.10

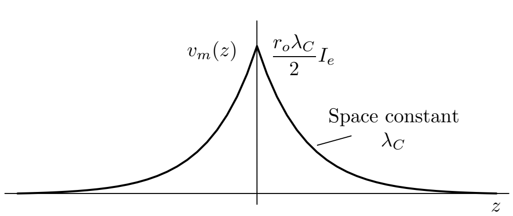


Figure 3.11

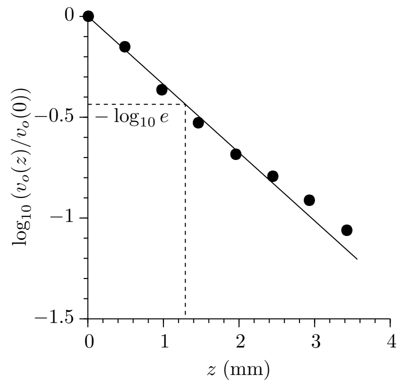


Figure 3.20

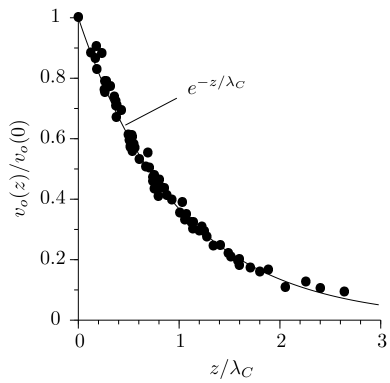


Figure 3.21

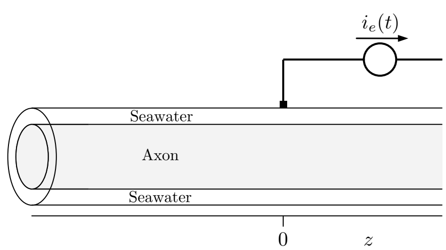


Figure 3.22

Assume infinitesimal electrode and $i_e(t)$ brief so that

$$k_e(z,t) = 0\ ; \quad \text{if } z \neq 0 \text{ or } t \neq 0.$$

For $t \neq 0$ or $z \neq 0$

$$v_m(z,t) + \tau_M \frac{\partial v_m}{\partial t} - \lambda_C^2 \frac{\partial^2 v_m}{\partial z^2} = 0$$

Let

$$v_m(z,t) = w(z,t) e^{-t/\tau_M}$$

Then

$$\frac{\partial v_m}{\partial t} = -\frac{1}{\tau_M} w(z,t) e^{-t/\tau_M} + \frac{\partial w}{\partial t} e^{-t/\tau_M}$$

$$\frac{\partial^2 v_m}{\partial z^2} = \frac{\partial^2 w}{\partial z^2} e^{-t/\tau_M}$$

Substituting,

$$w(z,t)e^{-t/\tau_M} - w(z,t)e^{-t/\tau_M} + \tau_M \frac{\partial w}{\partial t} e^{-t/\tau_M} - \lambda_C^2 \frac{\partial^2 w}{\partial z^2} e^{-t/\tau_M} = 0$$

$$\tau_M \frac{\partial w}{\partial t} = \lambda_C^2 \frac{\partial^2 w}{\partial z^2}$$

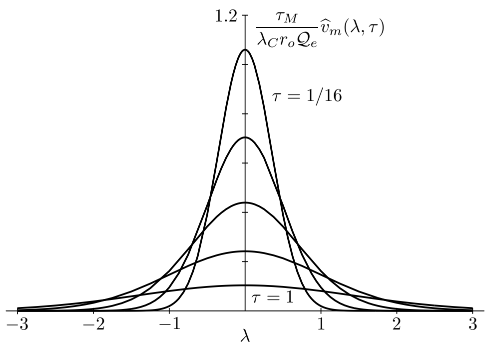


Figure 3.23

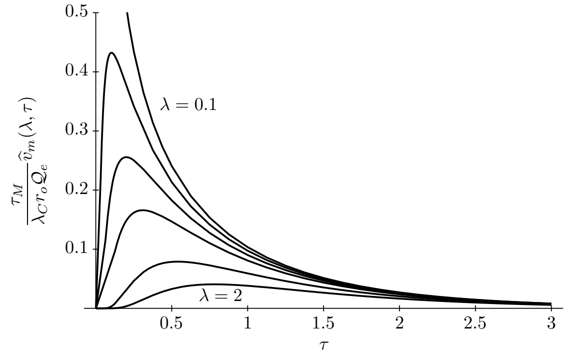


Figure 3.24

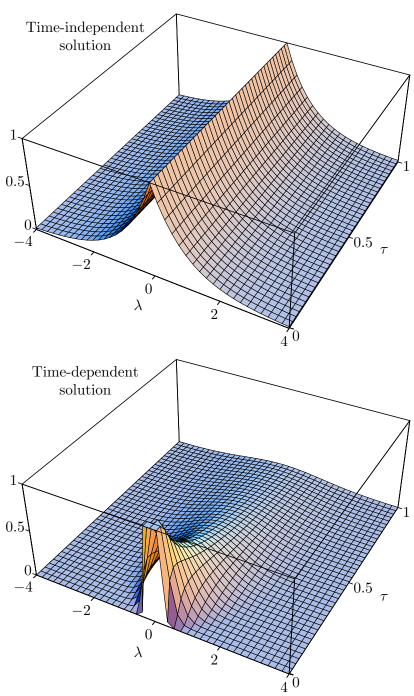


Figure 3.25

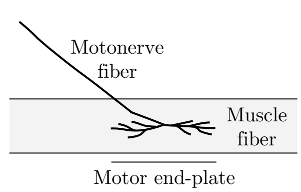


Figure 3.32

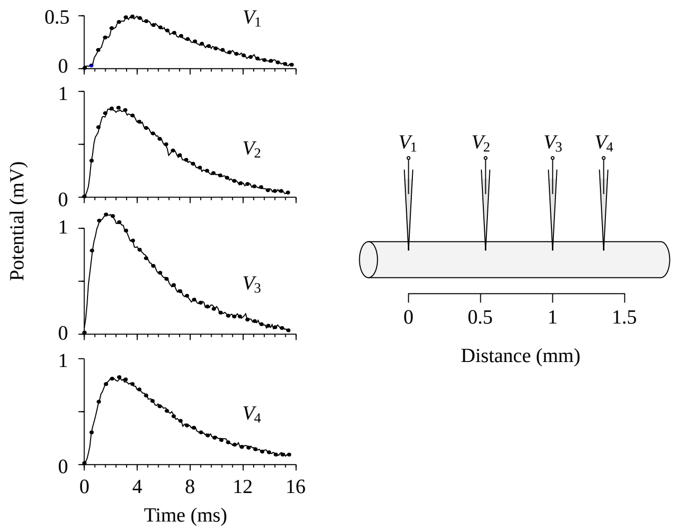


Figure 3.33

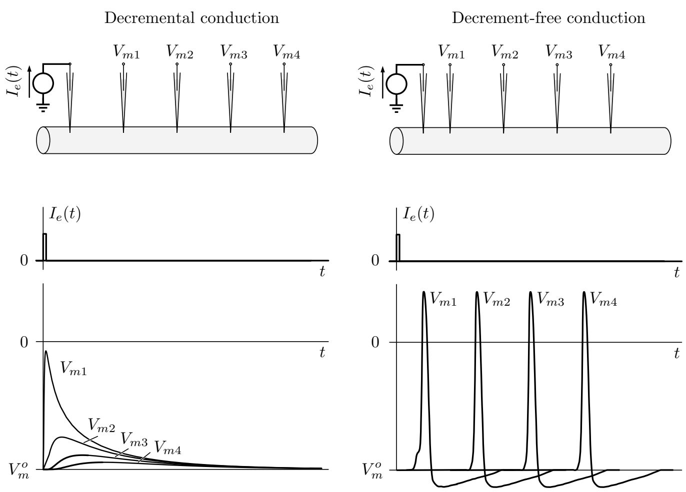


Figure 1.16

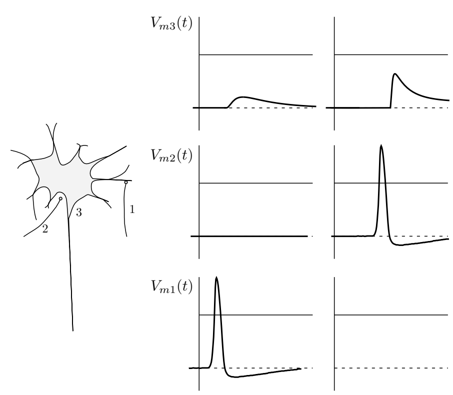


Figure 3.34

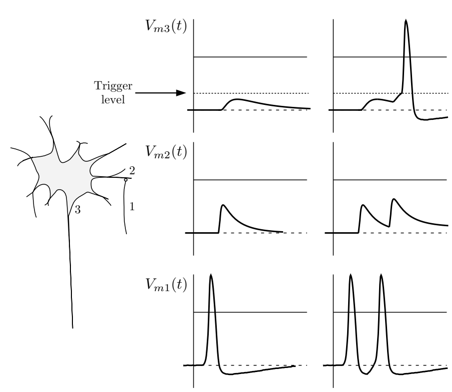


Figure 3.35

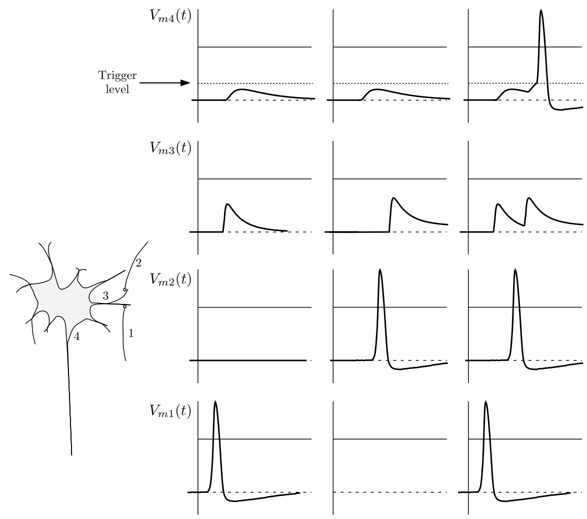


Figure 3.36

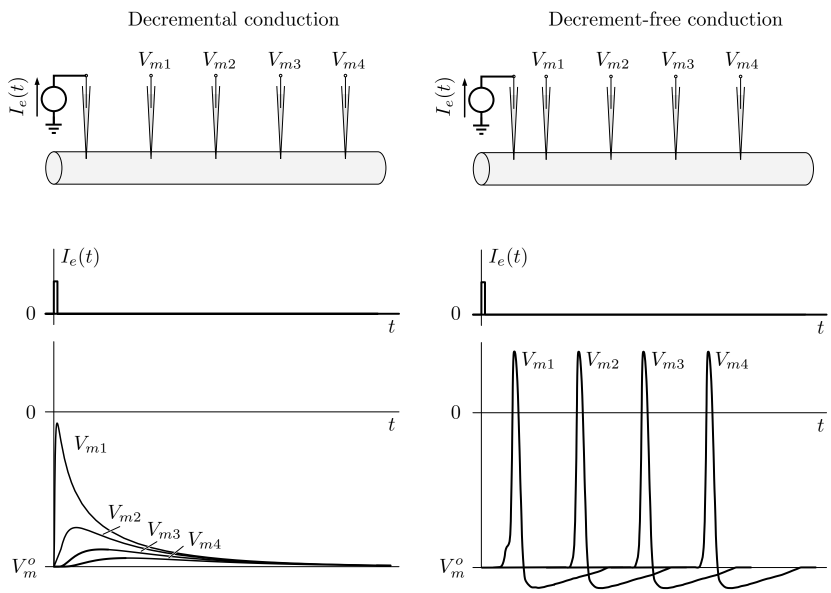


Figure 1.16

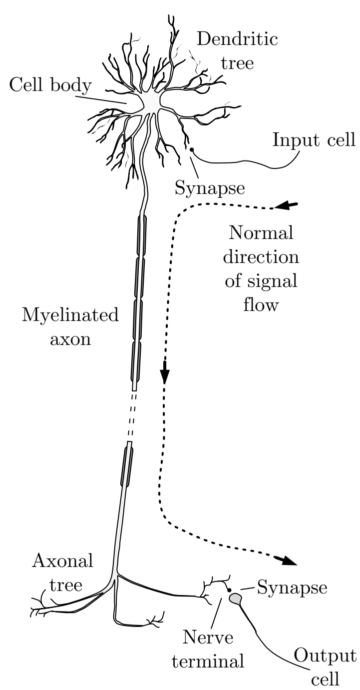


Figure 1.22