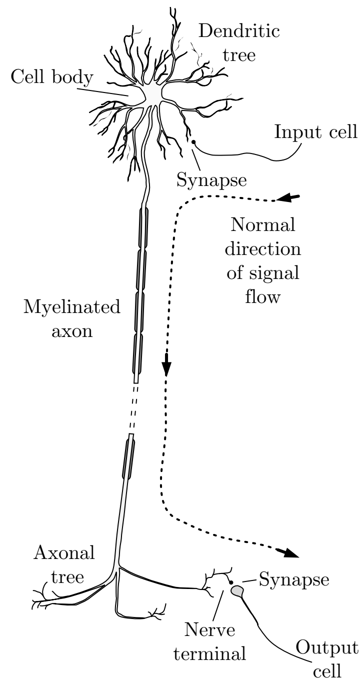


Figure 1.22

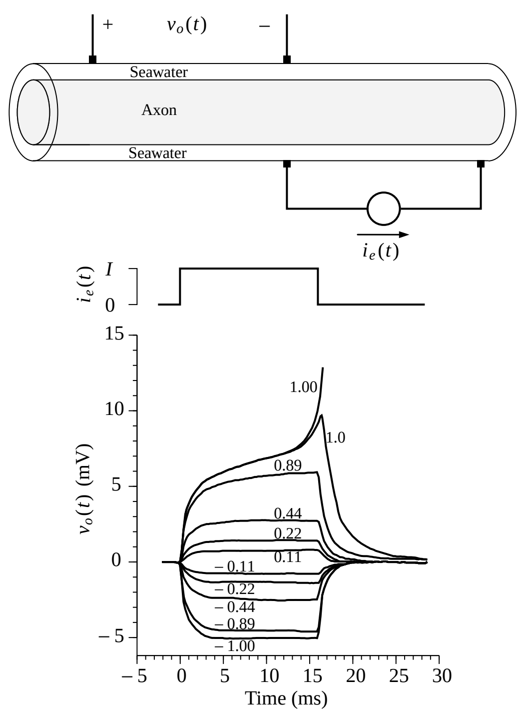


Figure 3.1

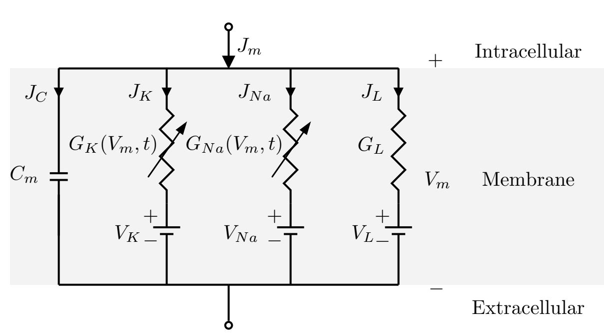


Figure 4.6

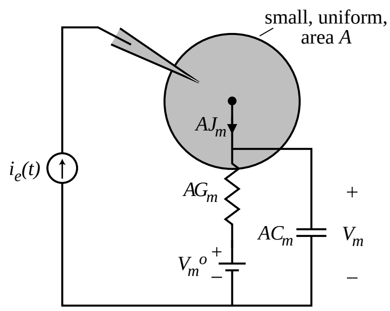
If ΔV_m small $\rightarrow \Delta m$, Δn, and Δh small ... ignore!

$$J_m = C_m \frac{dV_m}{dt} + G_{Na}(V_m - V_{Na}) + G_K(V_m - V_K) + G_L(V_m - V_L)$$

$$= C_m \frac{dV_m}{dt} + \left(\sum_n G_n\right) V_m - G_m(\sum_n \frac{G_n}{G_m} V_n)$$

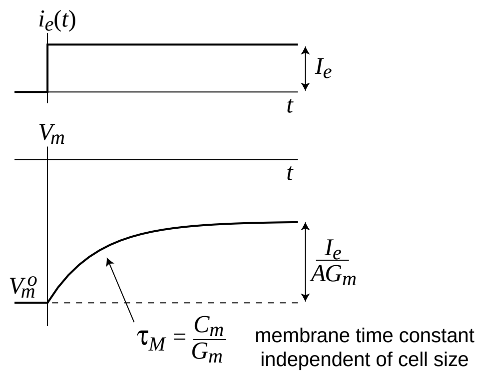
$$= C_m \frac{dV_m}{dt} + G_m V_m - G_m V_m^o$$

$$J_m = C_m \frac{dV_m}{dt} + G_m(V_m - V_m^o)$$

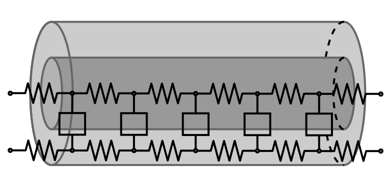


$$i_e(t) = AJ_m = AC_m \frac{dV_m}{dt} + AG_m(V_m - V_m^o)$$

$$\frac{AC_m}{AG_m} \frac{dV_m}{dt} + V_m = V_m^o + \frac{i_e(t)}{AG_m}$$



Core Conductor Model



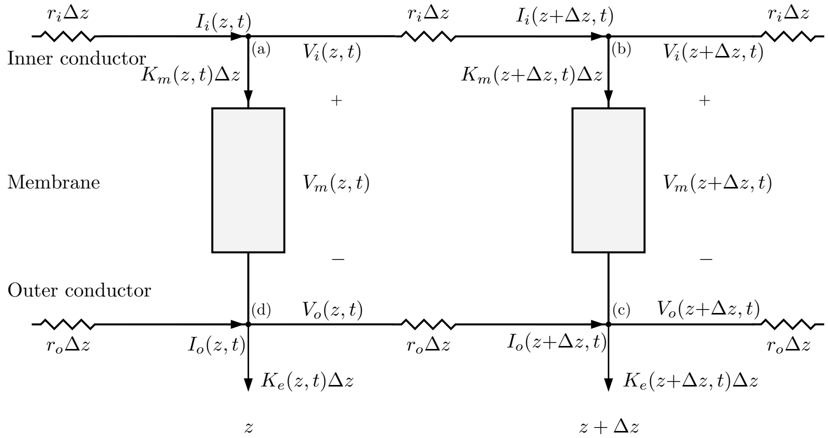


Figure 2.7

For ΔV_m small:

$$K_m = 2\pi a J_m = 2\pi a C_m \frac{dV_m}{dt} + 2\pi a G_m (V_m - V_m^o) = c_m \frac{dV_m}{dt} + g_m (V_m - V_m^o)$$

Combine with core-conductor model:

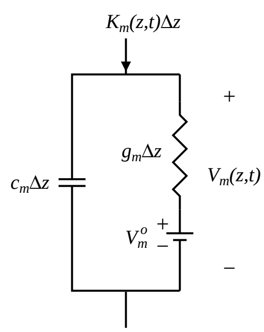
$$\frac{\partial^2 V_m}{\partial z^2} = (r_o + r_i) K_m - r_o K_e = (r_o + r_i)\left[c_m \frac{\partial V_m}{\partial t} + g_m (V_m - V_m^o) \right] - r_o K_e$$

$$V_m + \frac{c_m}{g_m}\frac{\partial V_m}{\partial t} - \frac{1}{g_m(r_o + r_i)}\frac{\partial^2 V_m}{\partial z^2} = V_m^o + \frac{r_o}{g_m(r_o + r_i)} K_e$$

$$V_m + \tau_M \frac{\partial V_m}{\partial t} - \lambda_C^2 \frac{\partial^2 V_m}{\partial z^2} = V_m^o + r_o \lambda_C^2 K_e$$

Let $V_m = v_m + V_m^o$:

$$v_m + \tau_M \frac{\partial v_m}{\partial t} - \lambda_C^2 \frac{\partial^2 v_m}{\partial z^2} = r_o \lambda_C^2 K_e \quad \text{(Cable Equation)}$$



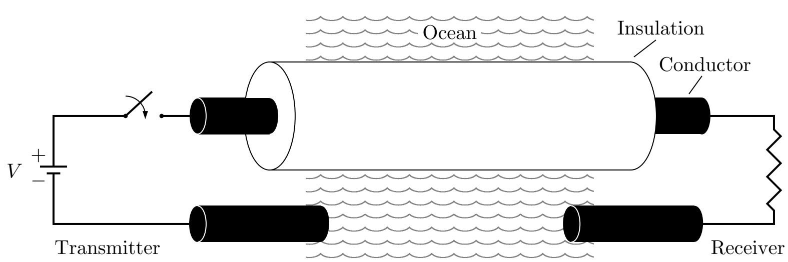


Figure 3.8

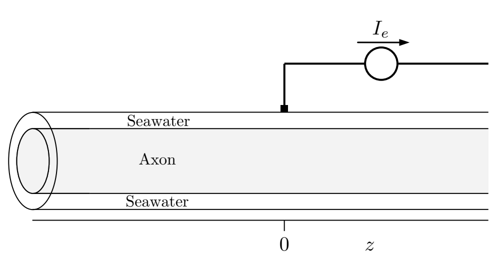


Figure 3.9

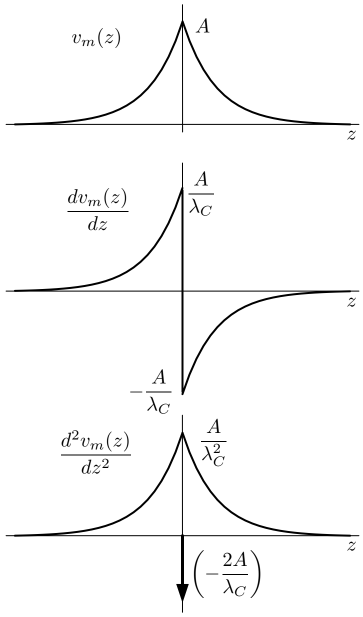


Figure 3.10

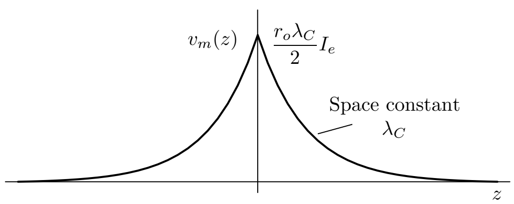


Figure 3.11

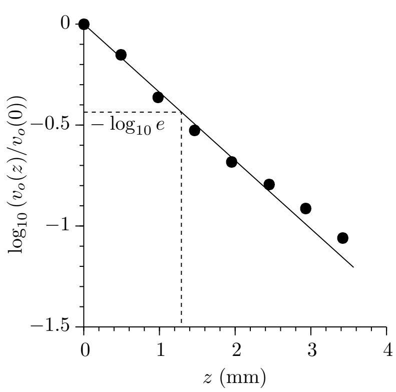


Figure 3.20

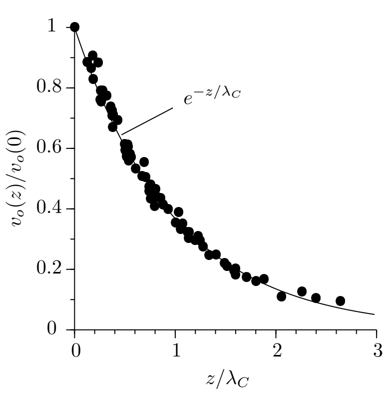


Figure 3.21