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SBE II: Homework 3

Experiment-1:

We are asked to perform dimensional analysis to determine the units of parameters ϵ and μ in the state equation for Calcium concentration:

$$\frac{dCa}{dt} = \epsilon(-\mu I_{Ca} - Ca)$$

Knowing that the units of $\frac{dCa}{dt}$ are $\frac{\mu M}{cm^3\ ms}$, we can clearly observe that the concentration of Calcium is in units of $\frac{\mu M}{cm^3}$. This means that the units of $\epsilon = [\frac{1}{ms}]$.

We notice that the μI_{Ca} term in the equation must be in units of $\frac{\mu M}{cm^3}$. Since current is in units of $\frac{mA}{cm^2}$, we know that the units of $\mu = \left[\frac{\mu M}{cm\ mA}\right]$.