• **If calcium is not cleared properly, it builds up**, leading to **unwanted spikes** (your mini-spike problem!).

**Analysis of Calcium Pump Mod Files & try\_set.py**

**Findings from cdp\_soma.mod (and other cdp\_\*.mod files)**

This .mod file **defines calcium dynamics, including diffusion, buffering, and calcium pumps**. Here are the relevant parameters:

🔹 **Calcium Pump Parameters**

• kpmp1 = 3e3 (/mM-ms) → Calcium pump binding rate

• kpmp2 = 1.75e1 (/ms) → Pump unbinding rate

• kpmp3 = 7.255e1 (/ms) → Rate of calcium extrusion

• TotalPump = 1e-15 → **🔹 Critical parameter: controls the total calcium pump density**

• **Setting this to 0 disables the pump**.

• Increasing it **could eliminate mini-spikes**.

🔹 **Calcium Concentration & Buffering**

• cainull = 45e-6 (mM) → Resting intracellular calcium concentration

• vmax = 0.1 → Maximum calcium removal rate

• Kp = 2.7e-3 (mM) → Calcium affinity of the pump

• **Buffering properties** (CBnull, PVnull) control how calcium is **sequestered**.

💡 **What to Modify?**

• Start by **increasing TotalPump**.

• Adjust kpmp1, kpmp2, and kpmp3 **to see if calcium is cleared faster**.

**Findings from try\_set.py**

• try\_set() defines **preconfigured parameter sweeps**.

• It currently **does NOT include calcium pump parameters**.

• Instead, it tests:

• **Sodium (Na) channels**

• **Potassium (K) channels**

• **Other conductances**

💡 **What to Modify in try\_set.py?**

1. **Add Calcium Pump Parameters** to test:

base = SpecSet(

morphology=["human/original"],

tstop=[300],

)

return [

base(soma\_TotalPump=[1e-15, 1e-12, 1e-9, 1e-6]), # Test different pump densities

base(soma\_kpmp1=[1e3, 3e3, 5e3]), # Vary calcium pump binding rate

base(soma\_vmax=[0.05, 0.1, 0.2]), # Test max pump capacity

]

2. **Run only 1 trial** by limiting parameter combinations.