Closed Ca²⁺ sub-system

Increasing peak ER Ca^{2+} efflux via simulated application of NMB

$$\frac{dc}{dt} = \begin{bmatrix} v_1 f_{\infty}(c) + v_2 \end{bmatrix} [c_{er} - c] - \frac{v_3 c^2}{k_3^2 + c^2} + j_0 - \frac{v_4 c^4}{k_4^4 + c^4}$$

$$\frac{dc_{tot}}{dt} = j_0 - \frac{v_4 c^4}{k_4^4 + c^4}$$

$$v_1^{\text{finf(c)}} = \frac{v_1 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.8 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.8 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.8 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^2 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 20)}$$

$$0.9 = \frac{v_1^4 f_{\infty}(c)}{v_1^4 \text{ doubled } (v_1 = 2$$

Doubling v1 (peak Ca²+) doubles sigh rhythm frequency

2150

2200

2250

2300

2350

2400

2450

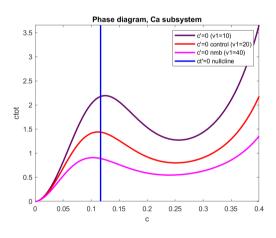
2500

What is v_1 changing in the model?

2100

2050

Observing the nulc lines in the phase diagram.



Observing the bifurcation diagram with v_1 . Note, we needed to scale cyt. Ca dynamics by 1/10.

