MINIMUM PUBLISHABLE UNIT

1. Evidence that there are pulses and waves in this tissue, and that there are differences between A and P compartments. This is fundamental and can either be a citation to Austin's future paper (meaning this paper has to wait), or can include some of Austin's results.
2. Show that variance of stochastic noise term directly results in a transition from no waves, to traveling waves, to random pulses
3. Comparison of different phenotypes pulled from parameter sweep and analysis of biological implications (ie patterning of refractory period, steady-state concentration, loss of wave activity)
4. Stability analysis showing which parameters are responsible for waves in a deterministic model (ie no variance in PLC signal)

# Title page

Title:

Authors: PA Brodskiy, C Narciso, Q Wu, A Jilkine, JJ Zartman

# Abstract

# Introduction

* + Calcium signaling[1]
  + Wing disc
  + Calcium modeling[2]–[4]

# Materials and Methods

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where represents the flux of out of the ER through IP3R channels, represents the flux of into the ER through SERCA pumps, represents the flux of Ca2+ leaking in and out of the medium in response to cytoplasmic concentration, and represents the effective diffusivity of .

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* + Experimental stuff
  + Derivation and repurposing of model
    - Explain why we used sneyd form of SERCA equation and hofer form of Jflux equation—ideally we would fit to Cl8 cell data
    - Explain why gamma distribution of signal makes sense in the context
  + Tuning of parameters
    - Explain reasoning for each parameter and realistic biological range
  + Solving PDEs
  + Possible numerical analysis

# Results

* + Variance of stochastic noise term directly results in a transition from no waves, to traveling waves, to random pulses
  + Comparison of different phenotypes pulled from parameter sweep and analysis of biological implications
    - Patterning of refractory period
    - Patterning of steady-state concentration
    - Biologically impossible results (ie. Loss of wave activity)
  + Formal numerical stability analysis should be conducted

# Discussion

# Conclusion

# Acknowledgments

# References

[1] C. Narciso, Q. Wu, P. Brodskiy, G. Garston, R. Baker, A. Fletcher, and J. Zartman, “Patterning of wound-induced intercellular Ca 2+ flashes in a developing epithelium,” *Phys. Biol.*, vol. 12, no. 5, p. 056005, 2015.

[2] J. Keener and J. Sneyd, *Mathematical Physiology: I: Cellular Physiology*, 2nd edition. New York, NY: Springer, 2008.

[3] J. Sneyd, B. T. Wetton, A. C. Charles, and M. J. Sanderson, “Intercellular calcium waves mediated by diffusion of inositol trisphosphate: a two-dimensional model,” *Am. J. Physiol. - Cell Physiol.*, vol. 268, no. 6, pp. C1537–C1545, Jun. 1995.

[4] T. Höfer, L. Venance, and C. Giaume, “Control and Plasticity of Intercellular Calcium Waves in Astrocytes: A Modeling Approach,” *J. Neurosci.*, vol. 22, no. 12, pp. 4850–4859, Jun. 2002.

# Supporting Material