SURF INTERIM REPORT 2

**Discuss work completed over the last month (discuss progress on data analysis). Include exact technical specifications and quantities and source or method of preparation for work you have done thus far. Present methods in chronological order**

* ATP Synthase model
* Investigation of reduced model
  + Developed SBML to ODE code
  + Studied what species reached ss quickly
  + Tried to remove more – ran into problems
  + Trying to minimize model more so that it can be used for design
  + Proposed ways to study: lumping parameters, nondimensionalization, SVD, PCA
  + Doing this to hope to use this better idk
* Minimal model progress
  + Limited by experimental data
  + Here is what we’ve extracted so far
  + Here is why we can’t really use it
* Techniques
  + Used autoReduce
* Also used nADPH regeneration model for use with others

**Discuss progress of work so far. What observations have you made? Describe how your observations are (or are not) in line with what you expected.**

* Have observed that this reduced model has some different dynamics depending on what you remove from the model
* Realized what quickly reaches steady state and what doesn’t
* This is in line with what I expected – helped with design decisions moving forward
* ATP synthase model works as expected
* NADPH model can be used, works as expected
* Also include conjunction with agrima and albert (how things work)
  + Timescale separation issue

**Describe any problems you have encountered. What was the source of the problem, and how have you worked (or how are you working) on solving the problem(s)?**

* Problems: autoReduce reduced model not as desired
* Sbml to ode not allowed (automated it)
* Not experimentally plausible to have H+ just pipetted in
  + Did reading to understand mechanisms that could be used
* Timescale separation issue – collaborating with others and making sure that models are compatible and accurate parameters are used

**What are your research goals for the remainder of the project? Have these goals changed since you started working on your project?**

* Research goals: show that I can have different mechanisms for atp regeneration
* Either one can be used in experimentally
* Do some experimental design in hopes
* Design what experiments I would need to prove stuff, and to have complete model
* Goals have kind of changed because I have investigated a different model, may work better in conjunction with others in lab, 15 enzymes to few proteins, am considering experimental difficulty
* ATP Rheostat
  + Lumped parameters (nondimensionalize, reduce dimensionality)
  + parameter sensitivity analysis for lumped parameters
  + helpful for parameter identifiability
  + currently rhere is no real intuition for what’s affecting the model, we want to only consider the phenomena we can control or are interested in
  + smaller dimensionality is import to the scientist and the designer, helps you look at it easier
* ATP Synthase
  + Consider adding the proton mechanisms
* Compare ATP Synthase and ATp rheostat
  + Which one is better, and more experimentally sensible