

CALIFORNIA INSTITUTE OF TECHNOLOGY
BioEngineering

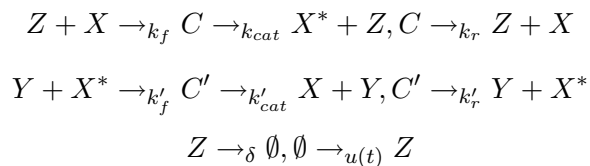
BE 250C

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Problem Set #8

Issued: 10 Mar 11
Due: 16 Mar 11

1. (BFS, 3.6) Consider the model of a covalent modification cycle from Chapter 2 of BFS, with the additional requirement that the protein kinase Z is produced and decays according to the reaction below:



and take $k_r, k_f \gg k_{cat}, \delta, u(t)$.

Employ singular perturbation with small parameter $\epsilon = \frac{\delta}{k_r}$ to obtain the approximated dynamics of $Z(t)$ and $X''(t)$.

2. In this problem, you will simulate the Notch Delta dynamics of fine patterning as a cellular automaton coupled with continuous dynamics, inspired by Collier's paper reviewed in class. The code is provided, you will just need to add code where specified.