Chapter 2: Reaction Kinetics and Biological Dynamics

Supplementary Material

Electronic Notebooks

- These all depend on Mathematica(R) and xCellerator. See Software availability
- Introductory example: {A->B, B->C}
- Mass action kinetics
- Stochastic simulation algorithm (SSA) example
- PIP3 metabolism
- Analytic solution of 2×2 master equation for binding/unbinding
- Analytic solution of trivalent reaction A+B <–> C
- MAPK cascade model of Huang and Ferrell 1996

Exercises

- Hill functions
- Master equation
- Trivalent mass action

Figures - electronic sources

- Hill functions, n=1 and n=2
- Convergence of bound/unbound probability
- S-E-P deterministic simulation
- S-E-P stochastic simulation

Bibliography - electronic access - chapter 2

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Text Outline

- 2.1 Example: Growth factor response
- 2.2 Elementary dynamical models
- 2.3 Mapping biology to mathematics and computation
- 2.4 Causal network dynamics
- 2.5 Summary

Missing Topics