



The **Lorry I. Lokey** Interdisciplinary Center
for Life Sciences and Engineering

המרכז הבין תחומי למדעי החיים
וההנדסה ע"ש לורי לוקיי

How biological molecules respond to signals: timescale flexibility

Introduction

Many biological molecules respond to external signals by biased transitions between two conformations. This simple property provides them with the ability to function as signal-processing devices. Although they are simple, these systems differ in several important ways from the simple systems traditionally analyzed in Linear Systems Theory. One central difference is that they are not characterized by a single timescale of relaxation, but rather this timescale is determined by the external signal itself. This timescale flexibility is a common property of biological sensing systems, but its implications from a signal-processing viewpoint are not well understood.

Project description

The approaches of engineering theory are proving to be highly valuable in analyzing and understanding biological systems. In this project we shall explore the implications of the timescale flexibility property on the signal-processing properties of molecules, using a mathematical model developed in our lab and basic tools of Systems Theory. Since the model describes a nonlinear system, we will rely on numerical simulations of responses and develop approximate methods to describe them for various signal environments.

Project Requirements

- Constructing a Matlab simulation for describing the response of molecules to external signals.
- Analyzing the model response for various time-dependent signal environments.
- Developing approximate analytic descriptions of the response.
- Relating the resulting signal-processing properties to biological functionality.

Project duration

One semester, with optional extension

Contact

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