Department of Biomathematics Seminar Series:
Frontiers in Systems and Integrative Biology

BIOMATH

Multistationarity in Biochemical Reaction Networks

Badal Joshi, Ph.D.
Assistant Professor
Department of Mathematics
California State University, San Marcos

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ABSTRACT:
The dynamics of a biochemical reaction network are frequently modeled using ordinary differential equations containing numerous unknown parameters (reaction rate constants). The values of these rate constants are difficult to determine experimentally. It is imperative, therefore, to develop theory that can determine the range of qualitative behaviors that a network can possess without requiring detailed knowledge of the parameters. In this talk, I will focus on the existence (or absence) of multiple positive steady states for a reaction network, also known as multistationarity. Existence of multiple positive steady states provides the underpinnings for switching in biochemical reaction networks, while uniqueness of a positive stable steady state is necessary for robust system output. In recent years, there have been multiple advances on the fronts of both ruling out multistationarity and establishing multistationarity in reaction networks. The theoretical results fall under three major areas: (a) deficiency theory, (b) injectivity (Jacobian criteria), (c) lifting/network embedding. I will describe the main ideas in the three areas along with some of the more recent results.

Host: Tom Chou, Ph.D.

To receive e-mail seminar notices, contact David Tomita (dtomita@biomath.ucla.edu)