Research In Progress Seminars

Tuesday, October 11, 2016
2:00PM

Location: CCBS Conference Room, 2622 Biological Sciences 3

Speaker:
Chris Rackauckas, Mathematics Department

Talk Title:
Mean-Independent Noise Attenuation and High Performance Simulation Methods for Stochastic Systems Biology

Abstract:
In this talk we will begin by exploring the retinoic acid signaling network in the developing zebrafish hindbrain. The system will be broken down into a simpler model in order to show how the topology of the signaling network may allow for intermediate states which have no mean-effect on the signal but allow for noise control. This result is then numerically tested in more complex models in order to explain how CRABP controls the fluctuation of retinoic acid while not affecting the signal level. The methods are also used to give evidence that the noise in the developing zebrafish hindbrain is predominantly intrinsic (multiplicative) noise due to retinoic acid's interactions. The talk will then shift to the numerical methods and software which were developed to handle the computational problems. A quick introduction to DifferentialEquations.jl, a Julia suite for solving ODEs, SDEs, and (S) PDEs, will be given, and novel methods for efficiently solving stochastic equations will be demonstrated.

Questions:
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