PIMS / AMI / GMU Seminar Series

Monday, May 10, 2010
10:00 a.m.
CAB 657

“Morphogen Gradient Formation and Tissue Patterning in Biological Development”

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Abstract

Morphogens (ligands) are molecular substances synthesized at some localized source and bound to cell surface receptors and other molecules as they are transported away from their source. The concentration gradients of different morphogen-receptor complexes are known to be responsible for cell signaling and differentiation leading to patterning of biological tissues during the developmental phase of the biological host. The talk will (1) summarize the essential biochemical processes at work in the signaling gradient formation of the important morphogen Dpp in Drosophila fruit flies, and (2) formulate two typical reaction diffusion type mathematical models for two different signaling gradient formations. The simpler model for the fly’s wing imaginal disc will enable us to discuss some typical mathematical and computational issues to be addressed for such models. The more complicated model for a fly embryo with a nonuniform cell receptor distribution will allow us to describe an inconsistency between results of two different experiments designed to study the effect of a special form of abnormal receptor distribution. The partial resolution of this inconsistency by our asymptotic analysis of the mathematical model poses a new challenge to develop a different asymptotic analysis for a complete resolution of the inconsistency.

Refreshments will be served in CAB 649 at 11:00 a.m.