



Special Colloquium

UCR
Mathematics
Department

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UC IRVINE

"MULTI-SCALE MODELS IN CELL AND DEVELOPMENTAL BIOLOGY "

Many biological processes in cell and developmental systems require intricate and well-coordinated regulation of spatial-temporal dynamics at multi-scales. How to incorporate the dynamics at different scales into one system is a big challenge in modeling of developmental systems. We developed several multi-scale models for different systems to study the dynamics in system development, pattern formation and cell migration. These model systems include: 1) a 3D model for hair follicle development and wave propagation, where follicle growth is regulated by the coupling of activator/inhibitor signaling that is described by stochastic PDEs, and we show that the co-option of these signals into skin macro-environment produces wave-like coupled hair growth; 2) hybrid models for pattern formation during embryo development, with gene regulation network described by stochastic PDEs/ODEs and cells modeled by sub-cellular element method, where we explore how chemical signaling with global information incorporated directs cell fate decision making and guides cell movement; 3) models for amoebae cells and mini aqua robots swimming in viscous fluid, where we either use techniques from complex analysis in a 2D model or asymptotic analysis for 3D linked-sphere-type models, to explore how various modes of cyclic deformation lead to cell movement in viscous fluid.

Wednesday, January 31st, 2018

Surge 284

Tea Time @ 4:00 p.m.

Talk Begins @ 4:10 p.m.

Ends @ 5:10 p.m.

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