



Department of Mathematics

香港城市大學
City University of Hong Kong

Seminar

DEPARTMENT OF MATHEMATICS

City University of Hong Kong

Modeling Flow Patterning in Growing Tissues: From Tip-Growing Plant Cells to pEMT Monolayers

by

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Date: 15 September 2025 (Monday)

Time: 4:00pm – 5:00pm

Venue: B5-311, Yeung Kin Man Academic Building

ABSTRACT

Biological tissues are active materials: they grow, exert forces, and rearrange themselves in response to internal and external signals. In this talk, I will present two systems where such activity gives rise to striking, organized flow patterns: tip-growing plant cells and partial EMT (pEMT) cell monolayers undergoing wound closure. In pEMT, cells remain associated with their neighbors but with weaker adhesion than in fully epithelial tissues. In plant cells, local wall softening and pressure-driven extension lead to persistent, polarized tip growth. In pEMT monolayers, collective cell divisions and rearrangements generate large-scale, quasi-circular flows during tissue closure. Both cases raise a common question: how are local shape and size changes patterned to produce global flow, particularly under geometric constraints? I will begin with experimental observations and physical intuition for these flows, highlighting characteristic symmetries and boundary behaviors. Then I will present modeling efforts that connect local growth and remodeling to global outcomes. Finally, I will show how these models can be used to infer local extension activities from global cell wall shape data in tip-growing plant cells, and to infer the mechanical states from kinematic data in pEMT monolayers.

~ALL ARE WELCOME~