

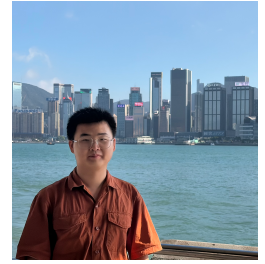
AIPHA/LIAM WEEKLY SEMINAR

Presented by : **Ruibin Jiang**
Ph.D. Student, Guangzhou University

Title : **Threshold Dynamics of Wild Mosquito Population
Suppression with Periodic Spatiotemporal Switching**

Time : 11:00 AM–12:00 PM, Friday, October 30, 2026

Location : Room 277, LIAM Lab, Kinsmen Building



Abstract

To account for limitations in the spatial coverage, we develop a reaction–diffusion model with periodic spatiotemporal switching to investigate the suppression of wild mosquito populations through localized releases. After analyzing the dynamics without intervention and under continuous release, we establish extinction and persistence conditions in the case of high-density wild mosquito populations using principal eigenvalue theory, sub- and supersolutions, and the monotonicity and strict subhomogeneity of the Poincaré map. For sufficiently high release densities, low-frequency release or insufficient spatial coverage lead to a unique globally asymptotically stable positive periodic solution, whereas high-frequency releases with spatial coverage at or above the critical length drive the wild mosquito population to extinction.

These findings highlight the joint effects of release density, frequency, and spatial coverage on control efficacy and suggest that localized releases can reduce control costs compared with releases throughout the entire region.

About The Speaker

Ruibin Jiang is a Ph.D. student in Applied Mathematics at Guangzhou University. Since November 2025, he has been furthering his research as a visiting Ph.D. student at York University.

His academic work is primarily focused on the application of continuous-time and discrete-time reaction–diffusion equations, the mathematical modeling of mosquito suppression, and periodic solutions of these models.