

Departmental Colloquium

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HH-3017

3 p.m.

Developing a temperature-driven map of the emerging tick vector of Lyme disease in Canada: a mathematical perspective

Abstract:

In this talk, I will report our recent investigations on the emergence of Lyme disease by using some complex nonlinear systems. A mechanistic model of the tick vector, *I. scapularis*, is first adapted to a periodic differential system. Using the temperature normals, seasonal temperature-driven development rates and host biting rates smoothed by Fourier analysis, and a next generation operator approach, the model is used to obtain values for the basic reproduction number (R_0) for *I. scapularis* at locations in southern Canada where the tick is established and emerging. The threshold temperature conditions for tick population survival ($R_0 = 1$) allow a map of R_0 for *I. scapularis*, the first such map for an arthropod vector, to be drawn for Canada east of the Rocky Mountains. The development of a deterministic model for *I. scapularis* that is capable of providing values for R_0 is a key step in our evolving ability to develop tools for assessment of Lyme disease risk emergence and for development of public health policies on surveillance, prevention and control. Further extensions of the model will also be discussed. This talk is based on collaboration work with researchers in the CODIGEOSIM project.