

## **Dr. Xiao-Qiang Zhao**

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Xiao-Qiang Zhao is a University Research Professor at the Memorial University of Newfoundland, Canada. He obtained his PhD from the Chinese Academy of Sciences in 1990. His research interests are dynamical systems, differential equations and mathematical biology. A series of his works on monotone dynamics, uniform persistence, traveling waves and spreading speeds, principal eigenvalues, and basic reproduction numbers have received extensive attention and citations. His research monograph (Springer 2003, with second edition in 2017) systematically combines the theory of nonlinear dynamics and applications to biology. Dr. Zhao's website is at <https://www.math.mun.ca/~zhao/>

Title: Basic Reproduction Numbers for Reaction-Diffusion Population Models

### Abstract:

The basic reproduction number (or ratio)  $R_0$  is an important concept in population biology. As a threshold quantity for population dynamics, it is unquestionably one of the most valuable mathematical ideas brought to theoretical ecology and epidemiology. In this talk, I first review the definition, stability equivalence, numerical computation of  $R_0$  for reaction-diffusion systems with compartmental structure. Then I introduce a spatial model of Zika virus transmission with seasonality and establish a threshold type result on the global stability in terms of  $R_0$ . Finally, I present numerical simulations for the Zika transmission in Rio de Janeiro Municipality, Brazil and briefly discuss the effects of some model parameters on  $R_0$ .