Using Maths to Understand the Transmission of Infectious Diseases

Luis Mier-y-Teran[1,2]

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Mathematics has been used to improve our understanding of the transmission of infectious diseases with success (and some failures). Mathematical tools have proved essential for providing an understanding of the basic features of an epidemic, the efficacy of vaccination campaigns in combating diseases, the effects of stochasticity and network connectivity between individuals in pathogen transmission and persistence, the contribution of air travel to the global propagation of diseases, etc. As it happens, the first use of mathematics in epidemiology was by Bernoulli in 1760; however, it was not until the early 20th century that the field was developed more systematically. In this talk, I will first give a brief overview of key concepts and frameworks used in mathematical epidemiology and then delve into some of the work that me and my collaborators have done, such as investigating the transmission dynamics of dengue viruses, the effects of stochasticity in pathogen extinction, the spread of pathogens via infected air travelers, etc.

[1]Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
[2]U.S. Naval Research Laboratory, Nonlinear Systems Dynamics Section, Plasma Physics Division, Code 6792, Washington, DC