An age-structured-like model for non-markovian sexually transmitted diseases in the coupled network

Junyuan Yang

Abstract

In this talk, we propose a general Edge-Based Age-structured-like Compartmental Model for STDs (EBACMS) allowing for general transmission and recovery times distributions in a coupled configuration network. We consider transmissions between homosexual men (MSM) with also heterosexual contacts. The obtained system is a coupled system of ordinary differential equations and partial differential equations. We study the positivity and existence of solutions, the basic reproduction number R_0, the global stability of disease-free equilibrium with $R_0 < 1$ and the final epidemic size F (the proportion of the population experiencing infection during the epidemic) with $R_0 > 1$. Numerical simulations indicate that given a fixed exponential transmission time distribution, a higher variance (with same mean) in general recovery time distribution gives smaller R_0 and F. Sensitivity analysis on R_0 and F in terms of the parameters illustrates that the MSM route has a greater impact on R_0 and F than the heterosexual transmission route when the transmission process is Markovian and the recovery process is arbitrary. Our results provide excellent guidance to develop appropriate prevention and control strategies.