HUAIPING ZHU, York University

Bifurcations and Complex Dynamics of an SIR Model with the Impact of Hospital Resources

In this talk, I will present an SIR model with a standard incidence rate and nonlinear recovery rate, formulated to consider the impact of available resource of the public health system especially the number of hospital beds. For the three dimensional model with total population regulated by both demographics and diseases incidence, we prove that the model can undergo backward bifurcation, saddle-node bifurcation, Hopf bifurcations and Bogdanov-Takens bifurcation of codimension 3. I shall also present and explain the bifurcation diagrams and give epidemiological interpretation of the complex dynamical behaviors of endemics due to the variation of the number of hospital beds. This study suggests that maintaining enough number of hospital beds is crucial for control of emerging and reemerging infectious diseases.