The impact of nonlinear perturbation to the dynamics of HIV model

Zhenfeng Shi¹, Daqing Jiang², Ningzhong Shi³, Tasawar Hayat⁴, and Ahmed Alsaedi⁵

¹Northeast Normal University

²College of Science, China University of Petroleum(East China)

³School of Mathematics and Statistics, Northeast Normal University

⁴Quaid-i-Azam University

⁵King Abdulaziz University

March 15, 2021

Abstract

In this paper, we developed and studied a stochastic HIV model with nonlinear perturbation. Through a rigorous analysis, we firstly showed that the solution of the stochastic model is positive and global. Then, by employing suitable stochastic Lyapunov functions, we prove that the stochastic model admit a unique ergodic stationary distribution. In addition, sufficient conditions for the extinction of HIV infection are derived. Finally, numerical simulations are employed to confirm our theoretical results.

Hosted file

HIVmodel.pdf available at <https://authorea.com/users/401703/articles/513703-the-impact-of-nonlinear-perturbation-to-the-dynamics-of-hiv-model>

figures/Fig1/Fig1-eps-converted-to.pdf

figures/Fig2/Fig2-eps-converted-to.pdf