Liu, Qun; Jiang, Daqing; Hayat, Tasawar; Alsaedi, Ahmed
Dynamical behavior of stochastic multigroup S-DI-A epidemic models for the transmission of HIV. (English) Zbl 1451.92299

Summary: In this paper, we study two stochastic multigroup S-DI-A epidemic models for the transmission of HIV. For the stochastic S-DI-A epidemic model with periodic coefficients, we first obtain sufficient conditions for persistence in the mean of the disease. Then in the case of persistence, we show that the model admits a positive $T$-periodic solution by using Khasminskii theory of periodic solution. Moreover, we establish sufficient conditions for exponential extinction of the infectious disease. For the stochastic S-DI-A epidemic model disturbed by both white and telegraph noises, we first establish sufficient conditions for persistence in the mean of the disease. Then in the case of persistence, we obtain sufficient conditions for the existence of a unique ergodic stationary distribution of the positive solutions by constructing a suitable stochastic Lyapunov function with regime switching and we also obtain sufficient conditions for exponential extinction of the system with regime switching.

MSC:
92D30 Epidemiology
34C25 Periodic solutions to ordinary differential equations

Keywords:
stochastic S-DI-A epidemic models; HIV transmission; positive $T$-periodic solution

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