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Extinction and permanence in a stochastic SIRS model in regime-switching with general incidence rate. (English) Zbl 1434.92035

Nonlinear Anal., Hybrid Syst. 34, 121-130 (2019).

Summary: In this paper, we consider a stochastic SIRS model with general incidence rate and perturbed by both white noise and color noise. We determine the threshold λ that is used to classify the extinction and permanence of the disease. In particular, $\lambda < 0$ implies that the disease-free $(K, 0, 0)$ is globally asymptotic stable, i.e., the disease will eventually disappear. If $\lambda > 0$ the epidemic is strongly stochastically permanent. Our result is considered as a significant generalization and improvement over the results in *Y. Cai* et al. [J. Differ. Equations 259, No. 12, 7463–7502 (2015; Zbl 1330.35464)], *Z. Han* and *J. Zhao* [Nonlinear Anal., Real World Appl. 14, No. 1, 352–364 (2013; Zbl 1267.34079)], *A. Lahrouz* et al. [Nonlinear Anal., Model. Control 16, No. 1, 59–76 (2011; Zbl 1271.93015)], *A. Settati* et al. [J. Appl. Math. Comput. 52, No. 1–2, 101–123 (2016; Zbl 1366.60098)] and *Y. Zhao* and *D. Jiang* [Appl. Math. Lett. 34, 90–93 (2014; Zbl 1314.92174)].

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