

1154-60-845

Dang H Nguyen*, 345 Gordon Palmer Hall Box 870350, Tuscaloosa, AL 35401. *Stochastic Functional Kolmogorov Equations.*

This work is concerned with stochastic functional Kolmogorov equations, which are nonlinear stochastic differential equations depending on the present as well as the past states. Our main motivations stem from a wide variety of applications in biological and ecological systems. A longstanding question of fundamental importance pertaining to biology and ecology is: What are the minimal necessary and sufficient conditions for long-term persistence and extinction or for longterm coexistence of interacting species of a population? Our aim here is to answer this question when environmental noise, time delays, and past dependence have to be taken into consideration. While there are many excellent treaties of stochastic Kolmogorov systems under stochastic differential equation setup, the work on stochastic Kolmogorov systems with past dependence is still scarce. The main techniques used in this paper include the newly developed functional Itô formula and asymptotic coupling and Harris-like theory for infinite dimensional systems specialized to functional equations. General theorems for stochastic functional Kolmogorov equations are developed first. Then these results are applied to a number of application areas. In contrast to the existing literature, sharp conditions are obtained. (Received September 11, 2019)