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Section:

16. Applications

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On stochastic functional-differential equations and its applications

Stochastic functional-differential equation with respect to the semimartingale $dx_t = a(t, x_{t-}^{-\infty})dA_t + b(t, x_{t-}^{-\infty})dM_t, \quad t \geq 0, \quad x_t = \varphi_t, \quad t \leq 0,$ (1) is considered. Here $x_{t-}^{-\infty}(s) = x(s),\ s \in (-\infty, t]$, is the trajectory of the process x_t up to the moment t, M_t is a martingale, A_t is an increasing process, φ_t is a given initial process. Ito equation and stochastic difference equation are embedded in Eq. (1). As the applications of Eq. (1) we consider the generalized stochastic approximation procedures, the controlled motion of a rigid body in the presence of random noises and some other technical problems, which can be described by Eq. (1) (see[1]). The method of Lyapunov-Krasovskii functional and some approaches from the martingale theory are used. Computer simulations are presented.

Reference: V. B. Kolmanovskii and A. D. Myshkis, *Applied Theory of Functional Differential Equations.* Kluwer Academic Publishers. Dortrecht-Boston-London. 1992.