The stability of neutral stochastic delay partial differential equations.*

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Abstract

The neutral deterministic delay differential equations plays an important role in mathematical analysis for the variable phenomenon in real world, for example physics, chemistry, engineering and life science. The existence and qualitative properties of solutions to the following neutral delay differential equation in $n-$ dimensional Euclidian space

$$\frac{d}{dt}\left[x(t)-B(x(t-r))\right]=A(t,x(t))+f(t-r,X(t-r))\ ,t\geq 0$$

have been discussed by many authors. As general references we have the monographs and books of Hale and Meyer, Hale and Verduyn, Kolmanovskii and Nosov, Kolmanovskii and Myshkis. On the other hand Rodokina considered the existence of solutions to $n-$dimensional neutral stochastic delay differential equations. Very recently Mao initialized the studies of the exponential stability of the solutions to this type equations(Liao and Mao, Mao). We are concerned with the neutral stochastic systems in a Hilbert space.

In this talk we discuss the exponential stability and exponential ultimate boundedness of solutions to the following neutral stochastic delay partial differential equation:

$$\begin{aligned} & d\left[X(t)-k(t-r,X(t-r))\right] && (1)\\ = \;& \left[A(t,X(t))+f(t-r,X(t-r))\right]dt+g(t,X(t))dW(t) && (2)\\ X(t) = \;& \varphi(s),\ -r\leq t\leq 0, && (3)\end{aligned}$$

where φ is $\Im_0-$measurable and $A:[0,\infty)\times V\longrightarrow V^*$ is an operator, $k:[-r,\infty)\times V\longrightarrow V$ is a global Lipschitz function, and $f:[-r,\infty)\times H\rightarrow V^*$ and $g:[-r,\infty)\times H\longrightarrow L_2^0(K,H)$ are continuous and globally Lipschitz functions in H.

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