On some stochastic parabolic differential equations in a Hilbert space

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In this paper, we consider the stochastic difference partial differential equations of the form

$$\begin{aligned} du(x,t,c) &= L(x,t,D)u(x,t,c)dt + \\ &+ \sum_{i=1}^{n}\sum_{j=1}^{k}[b_{ij}(x,t)\frac{\partial}{\partial x_i} + b_{0j}(x,t)]u(x,t-c_j,c)dw_{ij}(t), \end{aligned}$$

$$x = (x_1,...,x_n) \in S, \qquad t > 0, \qquad c = c_1,...,c_k), \qquad 0 < c_j < T_0,$$
$$j = 1,...,k.$$

We assume the initial and boundary conditions,

$$u(x,0,c) = u_0(x), \qquad x \in S$$
$$u(x,t,c)|_{\partial s} = 0, \qquad t > 0,$$

where S is a bounded set of the n-dimensional Euclidean space, ∂S is the smooth boundary of S, u_0 is a given suitable function and w_{ij} are mutually independent Wiener porocesses,

$$i = 1,...,n; \qquad j = 1,...,k.$$

It is supposed that $L(x,t,D)$ is a linear uniformly elliptic partial differential operator of the second order.
The existence and uniqueness of the solution of the considered stochastic mixed problems are studied. Some properties are also studied.
A more general stochastic problem is considered in Hilbert space and then the results concerning stochastic difference partial differential equations are obtained as applications,[1],[2].

References

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