S. I. Abdrakhmanov (Ufa, Russia) — **On the nonlinear heat-transfer and combustion equation with noise.**

Let a random process $V(t)$, $t \in [0, T]$ be given on the probability space $(\Omega, \mathcal{F}, P)$. Suppose the process $V(t)$ is continuous everywhere almost surely but differentiable nowhere. We study the Cauchy problem for the stochastic equation of heat conduction and combustion

$$u(s,x)-u(0,x) = \int_0^s (k(u)\cdot u_x)'_x dt + \int_0^s g(u) * dV(t), \quad u(0,x) = u_0(x), \quad (t,x) \in \mathbb{R}^+ \times \mathbb{R}, \quad (1)$$

where the second integral on the right-hand side is a symmetric integral with respect to process $V(t)$. If $V(t)$ is a Wiener process, then the second integral coincides with the Stratonovich stochastic integral. Here $u = u(t,x)$ is a temperature of the continuous medium, $k(u)$ is thermal diffusivity, $g(u)$ is a internal heat generation. We consider the case when noise affects the internal heat generation.

Theorem. *Let $k(u), g(u)$ be continuously differentiable functions, $g(u) \neq 0$ for any u, then the solution to problem* (1) *exists and is determined from the relation $\Phi(u) = V(t) + C(t,x)$, where $\Phi(u) = \int \frac{du}{g(u)}$. The function $C(t,x)$ satisfies the Cauchy problem*

$$C_t = k(u)\cdot C_{xx} + \Big(k(u)\cdot g(u)\Big)'_u \cdot (C_x)^2, \quad C(0,x) = \Phi(u_0) - V(0).$$

Also, other cases are investigated in the work, for example, we have considered the case when noise affects both terms the right side of the equation.

REFERENCES

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