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Anticipative Stochastic Differential Equations with Non-smooth Diffusion Coefficient

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摘要 In this paper we prove the existence and uniqueness of the solutions to the one-dimensional linear stochastic differential equation with Skorohod integral $$\ \ X_t(\omega)=\eta (\omega)+ \int^t_0 a_sX_s(\omega)d{\bf W}_s +\int^t_0 b_s X_s(\omega)ds , \ t\in [0,1],$$ where $({\bf W}_s)$ is the canonical Wiener process defined on the standard Wiener space $({\mathscr W}, {\mathscr H}, \mu)$, $ a $ is non-smooth and adapted, but $ \eta $ and b may be anticipating to the filtration generated by $({\bf W}_s)$. The intention of the paper is to eliminate the regularity of the diffusion coefficient a in the Malliavin sense, in the existing literature. The idea is to approach the non-smooth diffusion coefficient a by smooth ones.

关键词 Non-smooth and anticipative stochastic differential equations Skorohod integral Malliavin derivative

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Abstract In this paper we prove the existence and uniqueness of the solutions to the one-dimensional linear stochastic differential equation with Skorohod integral $$\ \ X_t(\omega)=\eta (\omega)+ \int^t_0 a_sX_s(\omega)d{\bf W}_s +\int^t_0 b_s X_s(\omega)ds , \ t\in [0,1],$$ where $({\bf W}_s)$ is the canonical Wiener process defined on the standard Wiener space $({\mathscr W}, {\mathscr H}, \mu)$, $ a $ is non-smooth and adapted, but $ \eta $ and b may be anticipating to the filtration generated by $({\bf W}_s)$. The intention of the paper is to eliminate the regularity of the diffusion coefficient a in the Malliavin sense, in the existing literature. The idea is to approach the non-smooth diffusion coefficient a by smooth ones.

Key words Non-smooth and anticipative stochastic differential equations Skorohod integral Malliavin derivative

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