

Fuzzy delay differential equations for finance

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Fuzzy differential equations was proposed by Liu [2] as a type of differential equations driven by Liu process just like that stochastic differential equations driven by Brownian motion. Let $(\Omega, \mathcal{P}, Cr)$ be a credibility space [1], let $(X(t))_{t \geq 0}$ be a fuzzy process [1], and let $X_t : [-\sigma, 0] \rightarrow \mathbb{R}$, defined by $X_t(u) = X(t+u)$, $t \geq 0$. Also, let $(C(t))_{t \geq 0}$ be a Liu process [1]. If $F, G : C_\sigma \rightarrow \mathbb{R}$ is a given functions, then

$$dX(t) = F(X_t)dt + G(X_t)dC(t), \quad (1)$$

where $C_\sigma := \{f : [-\sigma, 0] \rightarrow \mathbb{R}; f \text{ is continuous}\}$, is called a fuzzy delay differential equation.

In this paper we prove the existence and uniqueness theorem for fuzzy delay differential equation (1) under hypotheses that F and G are Lipschitz functions.

References

- [1] B. Liu, *Uncertainty Theory*, Springer-Verlag, Berlin, 2007.
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- [3] C. You, Existence and uniqueness theorem for fuzzy differential equation, <http://orsc.edu.cn/processes/080316.pdf>.