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SFDES WITH JUMPS UNDER CARATHÉODORY CONDITIONS

D. D. Huan[1,2] and R.P. Agarwal[3]

[1]Faculty of Basic Sciences,
Bacgiang Agriculture and Forestry University, Bacgiang 21000, Vietnam

[2]Vietnam National University, Hanoi,
144 Xuan Thuy Street, Cau Giay, Hanoi 10000, Vietnam

Email: diemdanghuan@gmail.com

[3]Department of Mathematics,
Texas A&M University-Kingsville, Kingsville, Texas, 78363, USA

Email: agarwal@tamuk.edu

Abstract. In this work, we prove the existence and uniqueness of solutions to neutral stochastic functional differential equations (SFDEs) with infinite delay and Poisson jumps under global and local Carathéodory conditions by means of Picard's approximation. Specially, we generalize the results established in [7,9,11]. An example illustrating the importance of obtained results is also given.

Keywords. Neutral SFDEs, Poisson jumps, Delay, Picard approximation.

AMS (MOS) subject classification: 60H15, 34K40.

1 Introduction

Qualitative properties such as existence, uniqueness, stability and ergodicity of stochastic differential equations (SDEs) have been extensively investigated by many authors (for example, see [1,2,4-6,9-13] and the references therein). Stochastic systems depend not only on the current state and a period of past state, but also on the rate of change for the past state, are said to be neutral SFDEs:

$$d[x(t) - g(x_t)] = f(t, x_t)dt + \sigma(t, x_t)dB(t), \quad t \in [t_0, T], \tag{1.1}$$

with an initial data

$$x_{t_0} = \xi = \{\xi(\theta) : -\tau < \theta \leq 0\} \tag{1.2}$$

which is an $\mathcal{F}_{t_0}$-measurable $\mathcal{C}((-\tau, 0]; \mathbb{R}^d)$-value random variable such that $\mathbb{E}\|\xi\|^2 < \infty$, where $x_t(\theta) = x(t + \theta)$ for $\theta \in (-\tau, 0]$ can be considered as a $\mathcal{C}((-\tau, 0]; \mathbb{R}^d)$-value stochastic process.

In [4], Mao proved the existence and uniqueness of solutions to the Eq.(1.1) with initial data (1.2) under Lipschitz condition, linear growth condition, and