

# Fuzzy Stochastic Differential Equations Driven by a Fuzzy Brownian Motion

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## Abstract

In our previous work, we study fuzzy Itô integrals driven by a fuzzy Brownian motion. In this article, we continue this study. The purpose of this paper is to study the weak uniqueness of fuzzy stochastic differential equations taking into account fuzzy Brownian motion. For instance, we construct the fuzzy stochastic differential equation driven by a fuzzy Brownian motion. To define and prove our results, we use the fuzzification, the alpha cut method and the Hausdorff distance between two fuzzy quantities. Some results are to our credit in this article like the instance, we construct the fuzzy stochastic differential equation driven by fuzzy Brownian motion. Furthermore, we develop fuzzy Itô calculus driven by a fuzzy Brownian motion. Our result complement existing ones in that the fuzzy version of Brownian motion is taken into account.

## Keywords

Adapted Fuzzy Stochastic Process, Fuzzy Itô Process, Fuzzy Itô Formula, Hukuhara Generalized Derivative

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## 1. Introduction

In our previous research, we have dealt with Fuzzy Itô Integral Driven by a Fuzzy Brownian Motion and in the present work, we develop Fuzzy stochastic differential equations driven by a fuzzy Brownian motion [1].

Historically, the earliest approach for deterministic fuzzy differential equations

# Stochastic Fuzzy Differential Equations With An Application

**LP Steffe**



## **Stochastic Fuzzy Differential Equations With An Application:**

Nonlinear Mathematics for Uncertainty and its Applications Shoumei Li, Xia Wang, Yoshiaki Okazaki, Jun Kawabe, Toshiaki Murofushi, Li Guan, 2011-07-21 This volume is a collection of papers presented at the international conference on Nonlinear Mathematics for Uncertainty and Its Applications NLMUA2011 held at Beijing University of Technology during the week of September 7-9 2011 The conference brought together leading researchers and practitioners involved with all aspects of nonlinear mathematics for uncertainty and its applications Over the last fifty years there have been many attempts in extending the theory of classical probability and statistical models to the generalized one which can cope with problems of inference and decision making when the model related information is scarce vague ambiguous or incomplete Such attempts include the study of nonadditive measures and their integrals imprecise probabilities and random sets and their applications in information sciences economics finance insurance engineering and social sciences The book presents topics including nonadditive measures and nonlinear integrals Choquet Sugeno and other types of integrals possibility theory Dempster Shafer theory random sets fuzzy random sets and related statistics set valued and fuzzy stochastic processes imprecise probability theory and related statistical models fuzzy mathematics nonlinear functional analysis information theory mathematical finance and risk managements decision making under various types of uncertainty and others

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*Stochastic Differential Equations and Their Application in Finance. An Overview* Erhabor Moses, 2020-02-14 Seminar paper from the year 2019 in the subject Mathematics Stochastics grade A University of Benin language English abstract The following work tries to examine and provide solutions to an array of equations most notably the Brownian motion the Ito integral and their application to finance In the context of this work chapter one deals with the introduction unique terms and notation and the usefulness in the project work Chapter two deals with Brownian motion and the Ito integral whereas chapter three deals with stochastic differential equations Chapter four handles the application of stochastic differential equations to finance and finally chapter five concludes the project

**Dynamic Systems and Applications** ,2007 Journal of Dong Hua University ,2004

**Journal of the Korean Mathematical Society** ,2005      **2002 IEEE Region 10 Conference on Computers. Communications, Control and Power Engineering** TENCON (2002, Beijing),2002      **Mathematical Reviews** ,2006

*Neural Networks and Other Soft Computing Techniques with Applications in the Oil Industry* Fred Aminzadeh,Paul De Groot,2006      Stochastic Differential Equations Bernt Oksendal,2013-03-09 These notes are based on a postgraduate course I gave on stochastic differential equations at Edinburgh University in the spring 1982 No previous knowledge about the subject was assumed but the presentation is based on some background in measure theory There are several reasons why one should learn more about stochastic differential equations They have a wide range of applications outside mathematics there are many fruitful connections to other mathematical disciplines and the subject has a rapidly developing life of its own as a fascinating research field with many interesting unanswered questions Unfortunately most of the literature about stochastic differential equations seems to place so much emphasis on rigor and completeness that it scares many nonexperts away These notes are an attempt to approach the subject from the nonexpert point of view Not knowing anything except rumours maybe about a subject to start with what would I like to know first of all My answer would be 1 In what situations does the subject arise 2 What are its essential features 3 What are the applications and the connections to other fields I would not be so interested in the proof of the most general case but rather in an easier proof of a special case which may give just as much of the basic idea in the argument And I would be willing to believe some basic results without proof at first stage anyway in order to have time for some more basic applications      **Computing Anticipatory Systems** D. M. Dubois,2001-07-13 This AIP Conference proceedings contains all papers which received a Best Paper Award as well as a selection of invited papers The scope of this volume encompasses the study research and development of concepts methodologies theories and mathematical models for designing modeling simulating optimizing controlling of computing anticipatory systems Computing systems refer to any rule based and learning based evolving natural and artificial systems Computation deals with manipulation of symbols in a large sense A computing anticipatory system is a system which computes its current states in taking into account its anticipatory states Strong anticipation refers to an anticipation of events built by or embedded in a system Weak anticipation refers to an anticipation of events predicted or forecasted from a model of a system The topics of the chapters are computing anticipatory systems significant progress in quantum mechanics and relativity chaos and complex systems fuzzy dynamics genetic algorithms and soft computing time anticipation and hyperincursion anticipation in psychology and cognition anticipation decision making economy and social systems and computational intelligence control and computing systems      AIAA Journal American Institute of Aeronautics and Astronautics,2001      Stochastic Differential Equations Ludwig Arnold,1974-04-23 Fundamentals of probability theory Markov processes and diffusion processes Wiener process and white noise Stochastic integrals The stochastic integral as a stochastic process stochastic differentials Stochastic differential equations existence and uniqueness of solutions Properties

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