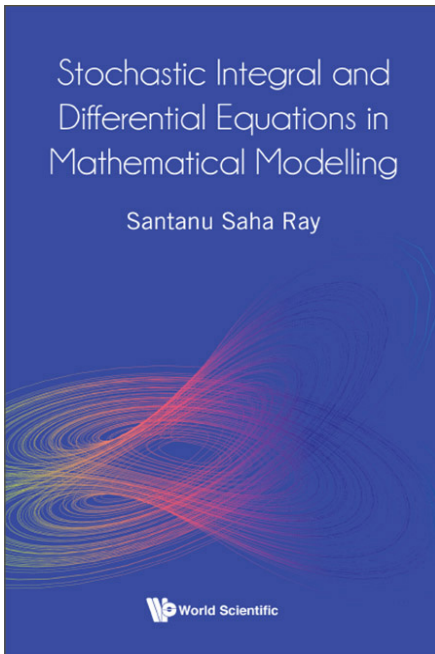


Stochastic Integral and Differential Equations in Mathematical Modelling



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ABOUT THE BOOK

The modelling of systems by differential equations usually requires that the parameters involved be completely known. Such models often originate from problems in physics or economics where we have insufficient information on parameter values. One important class of stochastic mathematical models is stochastic partial differential equations (SPDEs), which can be seen as deterministic partial differential equations (PDEs) with finite or infinite dimensional stochastic processes — either with colour noise or white noise. Though white noise is a purely mathematical construction, it can be a good model for rapid random fluctuations.

Stochastic Integral and Differential Equations in Mathematical Modelling concerns the analysis of discrete-time approximations for stochastic differential equations (SDEs) driven by Wiener processes. It also provides a theoretical basis for working with SDEs and stochastic processes.

This book is written in a simple and clear mathematical logical language, with basic definitions and theorems on stochastic calculus provided from the outset. Each chapter contains illustrated examples via figures and tables. The reader can also construct new wavelets by using the procedure presented in the book. *Stochastic Integral and Differential Equations in Mathematical Modelling* fulfils the existing gap in the literature for a comprehensive account of this subject area.

READERSHIP

Useful for Master degree students with numerical methods as a specialization and Research scholars working in this field. Supplementary book for undergraduate students or those in engineering working on wavelets.

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ABOUT THE AUTHOR

Dr Santanu Saha Ray is currently a Professor and Former Head of the Department of Mathematics, National Institute of Technology, Rourkela, India. Dr Saha Ray completed his PhD in 2008 from Jadavpur University, Kolkata, India. He received his MCA (Master of Computer Applications) degree in 2001 from the Indian Institute of Engineering Science and Technology (IIST), erstwhile Bengal Engineering College, Shibpur, India. He completed a master's degree in applied mathematics at Calcutta University, Kolkata, India, in 1998 and a bachelor's (honours) degree in mathematics at St. Xavier's College (currently known as St. Xavier's University, Kolkata), Kolkata, India, in 1996. He was elected Fellow of the Institute of Mathematics and Its Applications, United Kingdom, in 2018.

Stanford University together with the publishing house Elsevier and SciTech Strategies, has released a report of the top 2% best scientists in the World in various fields. Dr Saha Ray is enlisted in the World's Top 2% Scientists List by Stanford University, which was released recently and published in the open access Science journal PLoS (Public Library of Science). In India, Dr Saha Ray is in No. 1 position in the field of "Numerical and Computational Mathematics" and his corresponding World Ranking is 107. He is at the top of the most coveted list of "WORLD RANKING OF TOP 2% SCIENTISTS" from India as per a subject-wise analysis conducted by a team of scientists at Stanford University, led by Dr John PA Ioannidis. Stanford University's new list of the top 2% scientists in the world in various fields includes over 1000 scientists from India. Recently, he was duly elected for Full Membership in Sigma Xi, The Scientific Research Honor Society, USA.

Dr Saha Ray has more than 21 years of teaching experience at the undergraduate and postgraduate levels in glorious Institutes like National Institute of Technology, Rourkela and two renowned private Engineering Institutes in Kolkata, West Bengal. He has more than 20 years of research experience in various fields of Applied Mathematics. He has published many peer-reviewed research papers in numerous fields and various international SCI journals of repute. For a detailed

citation overview, the reader may be referred to Scopus. To date, he has more than 222 research papers published in journals of international repute, including more than 191 SCI journal papers. He was awarded an IOP Publishing Top Cited Author Award 2018 from India in the field of Physics published across the whole IOP Publishing portfolio in the past three years (2015 to 2017), using citations recorded in Web of Science.

He has solely authored a book entitled *Graph Theory with Algorithms and Its Applications: in Applied Science and Technology* published by Springer. A solely authored book entitled *Fractional Calculus with Applications for Nuclear Reactor Dynamics* has been published by the CRC Press of the Taylor & Francis Group. Another solely authored book entitled *Numerical Analysis with Algorithms and Programming* has been also published in CRC Press of Taylor & Francis Group, USA. Another three books entitled *Wavelet Methods for Solving Partial Differential Equations and Fractional Differential Equations*, *Generalized Fractional Order Differential Equations Arising in Physical Models* and *Novel Methods for Solving Linear and Nonlinear Integral Equations* have been published by CRC Press of Taylor & Francis Group, USA. Recently his book entitled *Nonlinear Differential Equations in Physics* has been launched by Springer Nature.

Currently, he is acting as editor-in-chief for the Springer Scopus international journal entitled *International Journal of Applied and Computational Mathematics*. He is also an associate editor of a Springer SCIE international journal *Mathematical Sciences* and reviewer of several journals of Elsevier, Springer and Taylor and Francis, etc. He was also been the lead guest editor in the International SCI journals of Hindawi Publishing Corporation, USA.

He has contributed papers on several topics, such as fractional calculus, mathematical modelling, mathematical physics, stochastic modelling, integral equations, and wavelet methods. He is a member of the Society for Industrial and Applied Mathematics (SIAM) and the American Mathematical Society (AMS).

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