[Books] Elements Of Stochastic Modelling

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Elements of Stochastic Modelling-K. A. Borovkov 2003 This textbook has been developed from the lecture notes for a one-semester course on stochastic modelling. It reviews the basics of probability theory and then covers the following topics: Markov chains, Markov decision processes, jump Markov processes, elements of queueing theory, basic renewal theory, elements of time series and simulation. Rigorous proofs are often replaced with sketches of arguments ? with indications as to why a particular result holds, and also how it is connected with other results ? and illustrated by examples. Wherever possible, the book includes references to more specialised texts containing both proofs and more advanced material related to the topics covered.

Elements of Stochastic Modelling-Konstantin Borovkov 2014-06-30 This is the expanded second edition of a successful textbook that provides a broad introduction to important areas of stochastic modelling. The original text was developed from lecture notes for a one-semester course for third-year science and actuarial students at the University of Melbourne. It reviewed the basics of probability theory and then covered the following topics: Markov chains, Markov decision processes, jump Markov processes, elements of queueing theory, basic renewal theory, elements of time series and simulation. The present edition adds new chapters on elements of stochastic calculus and introductory mathematical finance that logically complement the topics chosen for the first edition. This makes the book suitable for a larger variety of university courses presenting the fundamentals of modern stochastic modelling. Instead of rigorous proofs we often give only sketches of the arguments, with indications as to why a particular result holds and also how it is related to other results, and illustrate them by examples. Wherever possible, the book includes references to more specialised texts on respective topics that contain both proofs and more advanced material. Request Inspection Copy

Elements of Stochastic Modelling-Konstantin Aleksandrovich Borovkov 2014

An Introduction to Stochastic Modeling-Howard M. Taylor 2014-05-10 An Introduction to Stochastic Modeling provides information pertinent to the standard concepts and methods of stochastic modeling. This book presents the rich diversity of applications of stochastic processes in the sciences. Organized into nine chapters, this book begins with an overview of diverse types of stochastic models, which predicts a set of possible outcomes weighed by their likelihoods or probabilities. This text then provides exercises in the applications of simple stochastic analysis to appropriate problems. Other chapters consider the study of general functions of independent, identically distributed, nonnegative random variables representing the successive intervals between renewals. This book discusses as well the numerous examples of Markov branching processes that arise naturally in various scientific disciplines. The final chapter deals with queueing models, which aid the design process by predicting system performance. This book is a valuable resource for students of engineering and management science. Engineers will also find this book useful.

Markov Processes for Stochastic Modeling-Oliver Ibe 2013-05-22 Markov processes are processes that have limited memory. In particular, their dependence on the past is only through the previous state. They are used to model the behavior of many systems including communications systems, transportation networks, image segmentation and analysis, biological systems and DNA sequence analysis, random atomic motion and diffusion in physics, social mobility, population studies, epidemiology, animal and insect migration, queueing systems, resource management, dams, financial engineering, actuarial science, and decision systems. Covering a wide range of areas of application of Markov processes, this second

edition is revised to highlight the most important aspects as well as the most recent trends and applications of Markov processes. The author spent over 16 years in the industry before returning to academia, and he has applied many of the principles covered in this book in multiple research projects. Therefore, this is an applications-oriented book that also includes enough theory to provide a solid ground in the subject for the reader. Presents both the theory and applications of the different aspects of Markov processes Includes numerous solved examples as well as detailed diagrams that make it easier to understand the principle being presented Discusses different applications of hidden Markov models, such as DNA sequence analysis and speech analysis.

Probability and Stochastic Modeling-Vladimir I. Rotar 2012-08-25 A First Course in Probability with an Emphasis on Stochastic Modeling Probability and Stochastic Modeling not only covers all the topics found in a traditional introductory probability course, but also emphasizes stochastic modeling, including Markov chains, birth-death processes, and reliability models. Unlike most undergraduate-level probability texts, the book also focuses on increasingly important areas, such as martingales, classification of dependency structures, and risk evaluation. Numerous examples, exercises, and models using real-world data demonstrate the practical possibilities and restrictions of different approaches and help students grasp general concepts and theoretical results. The text is suitable for majors in mathematics and statistics as well as majors in computer science, economics, finance, and physics. The author offers two explicit options to teaching the material, which is reflected in "routes" designated by special "roadside" markers. The first route contains basic, self-contained material for a one-semester course. The second provides a more complete exposition for a two-semester course or self-study.

Stochastic Modeling-Barry L. Nelson 2012-10-11 Coherent introduction to techniques also offers a guide to the mathematical, numerical, and simulation tools of systems analysis. Includes formulation of models, analysis, and interpretation of results. 1995 edition.

Uncertainty Quantification and Stochastic Modeling with Matlab-Eduardo Souza de Cursi 2015-04-09 Uncertainty Quantification (UQ) is a relatively new research area which describes the methods and approaches used to supply quantitative descriptions of the effects of uncertainty, variability and errors in simulation problems and models. It is rapidly becoming a field of increasing importance, with many real-world applications within statistics, mathematics, probability and engineering, but also within the natural sciences. Literature on the topic has up until now been largely based on polynomial chaos, which raises difficulties when considering different types of approximation and does not lead to a unified presentation of the methods. Moreover, this description does not consider either deterministic problems or infinite dimensional ones. This book gives a unified, practical and comprehensive presentation of the main techniques used for the characterization of the effect of uncertainty on numerical models and on their exploitation in numerical problems. In particular, applications to linear and nonlinear systems of equations, differential equations, optimization and reliability are presented. Applications of stochastic methods to deal with deterministic numerical problems are also discussed. Matlab® illustrates the implementation of these methods and makes the book suitable as a textbook and for self-study. Discusses the main ideas of Stochastic Modeling and Uncertainty Quantification using Functional Analysis Details listings of Matlab® programs implementing the main methods which complete the methodological presentation by a practical implementation Construct your own implementations from provided worked examples

Elements of Applied Stochastic Processes-U. Narayan Bhat 2002-09-06 This 3rd edition of the successful Elements of Applied Stochastic Processes improves on the last edition by condensing the material and organising it into a more teachable format. It provides more in-depth coverage of Markov chains and simple Markov process and gives added emphasis to statistical inference in stochastic processes. Integration of theory and application offers improved teachability Provides a comprehensive introduction to stationary processes and time series analysis Integrates a broad set of applications into the text Utilizes a wealth of examples from research papers and monographs

Stochastic Modeling and Control-Ivan Ivanov 2012-11-28 Stochastic control plays an important role in many scientific and applied disciplines including communications, engineering, medicine, finance and many others. It is one of the effective methods being used to find optimal decision-making strategies in applications. The book provides a collection of outstanding investigations in various aspects of stochastic systems and their behavior. The book provides a self-contained treatment on practical aspects of stochastic modeling and calculus including applications drawn from engineering, statistics, and computer science. Readers should be familiar with basic probability theory and have a working knowledge of stochastic calculus. PhD students and researchers in stochastic control will find this book useful.

Stochastic Models In The Life Sciences And Their Methods Of Analysis-Wan Frederic Y M 2019-08-29 Biological processes are evolutionary in nature and often evolve in a noisy environment or in the presence of uncertainty. Such evolving phenomena are necessarily modeled mathematically by stochastic differential/difference equations (SDE), which have been recognized as essential for a true understanding of many biological phenomena. Yet, there is a dearth of teaching material in this area for interested students and researchers, notwithstanding the addition of some recent texts on stochastic modelling in the life sciences. The reason may well be the demanding mathematical pre-requisites needed to 'solve' SDE.A principal goal of this volume is to provide a working knowledge of SDE based on the premise that familiarity with the basic elements of a stochastic calculus for random processes is unavoidable. Through some SDE models of familiar biological phenomena, we show how stochastic methods developed for other areas of science and engineering are also useful in the life sciences. In the process, the volume introduces to biologists a collection of analytical and computational methods for research and applications in this emerging area of life science. The additions broaden the available tools for SDE models for biologists that have been limited by and large to stochastic simulations.

Stochastic Models in Queueing Theory-Jyotiprasad Medhi 2002-11-06 This is a graduate level textbook that covers the fundamental topics in queuing theory. The book has a broad coverage of methods to calculate important probabilities, and gives attention to proving the general theorems. It includes many recent topics, such as server-vacation models, diffusion approximations and optimal operating policies, and more about bulk-arrival and bull-service models than other general texts. * Current, clear and comprehensive coverage * A wealth of interesting and relevant examples and exercises to reinforce concepts * Reference lists provided after each chapter for further investigation

Introduction to Modeling and Analysis of Stochastic Systems-V. G. Kulkarni 2010-11-03 This book provides a self-contained review of all the relevant topics in probability theory. A software package called MAXIM, which runs on MATLAB, is made available for downloading. Vidyadhar G. Kulkarni is Professor of Operations Research at the University of North Carolina at Chapel Hill.

The Elements of Stochastic Processes with Applications to the Natural Sciences-Norman T. J. Bailey 1990-01-25 Develops an introductory and relatively simple account of the theory and application of the evolutionary type of stochastic process. Professor Bailey adopts the heuristic approach of applied mathematics and develops both theoretical principles and applied techniques simultaneously.

Stochastic Modelling and Control-Mark Davis 2013-03-08 This book aims to provide a unified treatment of input/output modelling and of control for discrete-time dynamical systems subject to random disturbances. The results presented are of wide applica bility in control engineering, operations research, econometric modelling and many other areas. There are two distinct approaches to mathematical modelling of physical systems: a direct analysis of the physical mechanisms that comprise the process, or a 'black box' approach based on analysis of input/output data. The second approach is adopted here, although of course the properties ofthe models we study, which within the limits of linearity are very general, are also relevant to the behaviour of systems represented by such models, however they are arrived at. The type of system we are interested in is a discrete-time or sampled-data system where the relation between input and output is (at least approximately) linear and where additive random dis turbances are also present, so that the behaviour of the system must be investigated by statistical methods. After a preliminary chapter summarizing elements of probability and linear system theory, we introduce in Chapter 2 some general linear stochastic models, both in input/output and state-space form. Chapter 3 concerns filtering theory: estimation of the state of a dynamical system from noisy observations. As well as being an important topic in its own right, filtering theory provides the link, via the so-called innovations representation, between input/output models (as identified by data analysis) and state-space models, as required for much contemporary control theory.

Continuous-time Stochastic Control and Optimization with Financial Applications-Huyên Pham 2009-05-28 Stochastic optimization problems arise in decision-making problems under uncertainty, and find various applications in economics and finance. On the other hand, problems in finance have recently led to new developments in the theory of stochastic control. This volume provides a systematic treatment of stochastic optimization problems applied to finance by presenting the different existing methods: dynamic programming, viscosity solutions, backward stochastic differential equations, and martingale duality methods. The theory is discussed in the context of recent developments in this field, with complete and detailed proofs, and is illustrated by means of concrete examples from the world of finance: portfolio allocation, option hedging, real options, optimal investment, etc. This book is directed towards graduate students and researchers in mathematical finance, and will also benefit applied mathematicians interested

in financial applications and practitioners wishing to know more about the use of stochastic optimization methods in finance.

Essentials of Stochastic Finance-Albert N. Shiryaev 1999 Readership: Undergraduates and researchers in probability and statistics; applied, pure and financial mathematics; economics; chaos.

Stochastic Modeling in Economics and Finance-Jitka Dupacova 2006-04-18 In Part I, the fundamentals of financial thinking and elementary mathematical methods of finance are presented. The method of presentation is simple enough to bridge the elements of financial arithmetic and complex models of financial math developed in the later parts. It covers characteristics of cash flows, yield curves, and valuation of securities. Part II is devoted to the allocation of funds and risk management: classics (Markowitz theory of portfolio), capital asset pricing model, arbitrage pricing theory, asset & liability management, value at risk. The method explanation takes into account the computational aspects. Part III explains modeling aspects of multistage stochastic programming on a relatively accessible level. It includes a survey of existing software, links to parametric, multiobjective and dynamic programming, and to probability and statistics. It focuses on scenario-based problems with the problems of scenario generation and output analysis discussed in detail and illustrated within a case study.

Introduction to Stochastic Models-Marius Iosifescu 2013-03-04 This book provides a pedagogical examination of the way in which stochastic models are encountered in applied sciences and techniques such as physics, engineering, biology and genetics, economics and social sciences. It covers Markov and semi-Markov models, as well as their particular cases: Poisson, renewal processes, branching processes, Ehrenfest models, genetic models, optimal stopping, reliability, reservoir theory, storage models, and queuing systems. Given this comprehensive treatment of the subject, students and researchers in applied sciences, as well as anyone looking for an introduction to stochastic models, will find this title of invaluable use.

Elements of Random Walk and Diffusion Processes-Oliver C. Ibe 2013-08-29 Presents an important and unique introduction to random walk theory Random walk is a stochastic process that has proven to be a useful model in understanding discrete-state discrete-time processes across a wide spectrum of scientific disciplines. Elements of Random Walk and Diffusion Processes provides an interdisciplinary approach by including numerous practical examples and exercises with real-world applications in operations research, economics, engineering, and physics. Featuring an introduction to powerful and general techniques that are used in the application of physical and dynamic processes, the book presents the connections between diffusion equations and random motion. Standard methods and applications of Brownian motion are addressed in addition to Levy motion, which has become popular in random searches in a variety of fields. The book also covers fractional calculus and introduces percolation theory and its relationship to diffusion processes. With a strong emphasis on the relationship between random walk theory and diffusion processes, Elements of Random Walk and Diffusion Processes features: Basic concepts in probability, an overview of stochastic and fractional processes, and elements of graph theory Numerous practical applications of random walk across various disciplines, including how to model stock prices and gambling, describe the statistical properties of genetic drift, and simplify the random movement of molecules in liquids and gases Examples of the real-world applicability of random walk such as node movement and node failure in wireless networking, the size of the Web in computer science, and polymers in physics Plentiful examples and exercises throughout that illustrate the solution of many practical problems Elements of Random Walk and Diffusion Processes is an ideal reference for researchers and professionals involved in operations research, economics, engineering, mathematics, and physics. The book is also an excellent textbook for upper-undergraduate and graduate level courses in probability and stochastic processes, stochastic models, random motion and Brownian theory, random walk theory, and diffusion process techniques.

Modeling and Analysis of Stochastic Systems-Vidyadhar G. Kulkarni 1996-05-15 This practical text aims to enable students in engineering, business, operations research, public policy, and computer science to model and analyze stochastic systems. The major classes of useful stochastic processes - discrete and continuous time Markov chains, renewal processes, regenerative processes, and Markov regenerative processes - are presented, with an emphasis on modelling real-life situations with stochastic elements and analyzing the resulting stochastic model.

Stochastic Control Theory-Makiko Nisio 2014-11-27 This book offers a systematic introduction to the optimal stochastic control theory via the dynamic programming principle, which is a powerful tool to analyze control problems. First we consider completely observable control problems with finite horizons. Using a time discretization we construct a nonlinear semigroup related to the dynamic programming

principle (DPP), whose generator provides the Hamilton–Jacobi–Bellman (HJB) equation, and we characterize the value function via the nonlinear semigroup, besides the viscosity solution theory. When we control not only the dynamics of a system but also the terminal time of its evolution, control-stopping problems arise. This problem is treated in the same frameworks, via the nonlinear semigroup. Its results are applicable to the American option price problem. Zero-sum two-player time-homogeneous stochastic differential games and viscosity solutions of the Isaacs equations arising from such games are studied via a nonlinear semigroup related to DPP (the min-max principle, to be precise). Using semi-discretization arguments, we construct the nonlinear semigroups whose generators provide lower and upper Isaacs equations. Concerning partially observable control problems, we refer to stochastic parabolic equations driven by colored Wiener noises, in particular, the Zakai equation. The existence and uniqueness of solutions and regularities as well as Itô's formula are stated. A control problem for the Zakai equations has a nonlinear semigroup whose generator provides the HJB equation on a Banach space. The value function turns out to be a unique viscosity solution for the HJB equation under mild conditions. This edition provides a more generalized treatment of the topic than does the earlier book Lectures on Stochastic Control Theory (ISI Lecture Notes 9), where time-homogeneous cases are dealt with. Here, for finite time-horizon control problems, DPP was formulated as a one-parameter nonlinear semigroup, whose generator provides the HJB equation, by using a time-discretization method. The semigroup corresponds to the value function and is characterized as the envelope of Markovian transition semigroups of responses for constant control processes. Besides finite time-horizon controls, the book discusses control-stopping problems in the same frameworks.

A Probabilistic Theory of Pattern Recognition-Luc Devroye 2013-11-27 A self-contained and coherent account of probabilistic techniques, covering: distance measures, kernel rules, nearest neighbour rules, Vapnik-Chervonenkis theory, parametric classification, and feature extraction. Each chapter concludes with problems and exercises to further the readers understanding. Both research workers and graduate students will benefit from this wide-ranging and up-to-date account of a fast- moving field.

Identifiability In Stochastic Models-Gerard Meurant 2012-09-18 The problem of identifiability is basic to all statistical methods and data analysis, occurring in such diverse areas as Reliability Theory, Survival Analysis, and Econometrics, where stochastic modeling is widely used. Mathematics dealing with identifiability per se is closely related to the so-called branch of "characterization problems" in Probability Theory. This book brings together relevant material on identifiability as it occurs in these diverse fields.

Elements Of Stochastic Dynamics-Guo-qiang Cai 2016-08-11 Stochastic dynamics has been a subject of interest since the early 20th Century. Since then, much progress has been made in this field of study, and many modern applications for it have been found in fields such as physics, chemistry, biology, ecology, economy, finance, and many branches of engineering including Mechanical, Ocean, Civil, Bio, and Earthquake Engineering.Elements of Stochastic Dynamics aims to meet the growing need to understand and master the subject by introducing fundamentals to researchers who want to explore stochastic dynamics in their fields and serving as a textbook for graduate students in various areas involving stochastic uncertainties. All topics within are presented from an application approach, and may thus be more appealing to users without a background in pure Mathematics. The book describes the basic concepts and theories of random variables and stochastic processes in detail; provides various solution procedures for systems subjected to stochastic excitations; introduces stochastic stability and bifurcation; and explores failures of stochastic systems. The book also incorporates some latest research results in modeling stochastic processes; in reducing the system degrees of freedom; and in solving nonlinear problems. The book also provides numerical simulation procedures of widely-used random variables and stochastic processes.A large number of exercise problems are included in the book to aid the understanding of the concepts and theories, and may be used for as course homework.

Stochastic Processes with Applications-Antonio Di Crescenzo 2019-11-28 Stochastic processes have wide relevance in mathematics both for theoretical aspects and for their numerous real-world applications in various domains. They represent a very active research field which is attracting the growing interest of scientists from a range of disciplines. This Special Issue aims to present a collection of current contributions concerning various topics related to stochastic processes and their applications. In particular, the focus here is on applications of stochastic processes as models of dynamic phenomena in research areas certain to be of interest, such as economics, statistical physics, queuing theory, biology, theoretical neurobiology, and reliability theory. Various contributions dealing with theoretical issues on stochastic processes are also included.

Stochastic Programming-András Prékopa 2013-03-09 Stochastic programming - the science that provides

us with tools to design and control stochastic systems with the aid of mathematical programming techniques - lies at the intersection of statistics and mathematical programming. The book Stochastic Programming is a comprehensive introduction to the field and its basic mathematical tools. While the mathematics is of a high level, the developed models offer powerful applications, as revealed by the large number of examples presented. The material ranges form basic linear programming to algorithmic solutions of sophisticated systems problems and applications in water resources and power systems, shipbuilding, inventory control, etc. Audience: Students and researchers who need to solve practical and theoretical problems in operations research, mathematics, statistics, engineering, economics, insurance, finance, biology and environmental protection.

Monte Carlo Methods in Financial Engineering-Paul Glasserman 2013-03-09 From the reviews: "Paul Glasserman has written an astonishingly good book that bridges financial engineering and the Monte Carlo method. The book will appeal to graduate students, researchers, and most of all, practicing financial engineers [...] So often, financial engineering texts are very theoretical. This book is not." --Glyn Holton, Contingency Analysis

Essentials of Stochastic Processes-Richard Durrett 2016-11-07 Building upon the previous editions, this textbook is a first course in stochastic processes taken by undergraduate and graduate students (MS and PhD students from math, statistics, economics, computer science, engineering, and finance departments) who have had a course in probability theory. It covers Markov chains in discrete and continuous time, Poisson processes, renewal processes, martingales, and option pricing. One can only learn a subject by seeing it in action, so there are a large number of examples and more than 300 carefully chosen exercises to deepen the reader's understanding. Drawing from teaching experience and student feedback, there are many new examples and problems with solutions that use TI-83 to eliminate the tedious details of solving linear equations by hand, and the collection of exercises is much improved, with many more biological examples. Originally included in previous editions, material too advanced for this first course in stochastic processes has been eliminated while treatment of other topics useful for applications has been expanded. In addition, the ordering of topics has been improved; for example, the difficult subject of martingales is delayed until its usefulness can be applied in the treatment of mathematical finance.

Markov Processes for Stochastic Modeling (Revised)-Oliver Ibe 2013-06-01 Markov processes are processes that have limited memory. In particular, their dependence on the past is only through the previous state. They are used to model the behavior of many systems including communications systems, transportation networks, image segmentation and analysis, biological systems and DNA sequence analysis, random atomic motion and diffusion in physics, social mobility, population studies, epidemiology, animal and insect migration, queueing systems, resource management, dams, financial engineering, actuarial science, and decision systems. Covering a wide range of areas of application of Markov processes, this second edition is revised to highlight the most important aspects as well as the most recent trends and applications of Markov processes. The author spent over 16 years in the industry before returning to academia, and he has applied many of the principles covered in this book in multiple research projects. Therefore, this is an applications-oriented book that also includes enough theory to provide a solid ground in the subject for the reader. Presents both the theory and applications of the different aspects of Markov processes Includes numerous solved examples as well as detailed diagrams that make it easier to understand the principle being presented Discusses different applications of hidden Markov models, such as DNA sequence analysis and speech analysis.

An Introduction to the Theory of Probability-Parimal Mukhopadhyay 2012 The Theory of Probability is a major tool that can be used to explain and understand the various phenomena in different natural, physical and social sciences. This book provides a systematic exposition of the theory in a setting which contains a balanced mixture of the classical approach and the modern day axiomatic approach. After reviewing the basis of the theory, the book considers univariate distributions, bivariate normal distribution, multinomial distribution and convergence of random variables. Difficult ideas have been explained lucidly and have been augmented with explanatory notes, examples and exercises. The basic requirement for reading this book is simply a knowledge of mathematics at graduate level. This book tries to explain the difficult ideas in the axiomatic approach to the theory of probability in a clear and comprehensible manner. It includes several unusual distributions including the power series distribution that have been covered in great detail. Readers will find many worked-out examples and exercises with hints, which will make the book easily readable and engaging. The author is a former Professor of the Indian Statistical Institute, India.

Elements of Queueing Theory-Francois Baccelli 2013-11-11 This fundamental exposition of queueing

theory, written by leading researchers, answers the need for a mathematically sound reference work on the subject and has become the standard reference. The thoroughly revised second edition contains a substantial number of exercises and their solutions, which makes the book suitable as a textbook.
Stochastic Structural Dynamics-Cho W. S. To 2013-11-08 One of the first books to provide in-depth and systematic application of finite element methods to the field of stochastic structural dynamics The parallel developments of the Finite Element Methods in the 1950's and the engineering applications of stochastic processes in the 1940's provided a combined numerical analysis tool for the studies of dynamics of structures and structural systems under random loadings. In the open literature, there are books on statistical dynamics of structures and books on structural dynamics with chapters dealing with random response analysis. However, a systematic treatment of stochastic structural dynamics applying the finite element methods seems to be lacking. Aimed at advanced and specialist levels, the author presents and illustrates analytical and direct integration methods for analyzing the statistics of the response of structures to stochastic loads. The analysis methods are based on structural models represented via the Finite Element Method. In addition to linear problems the text also addresses nonlinear problems and non-stationary random excitation with systems having large spatially stochastic property variations. A systematic treatment of stochastic structural dynamics applying the finite element methods Highly illustrated throughout and aimed at advanced and specialist levels, it focuses on computational aspects instead of theory Emphasizes results mainly in the time domain with limited contents in the time-frequency domain Presents and illustrates direction integration methods for analyzing the statistics of the response of linear and nonlinear structures to stochastic loads Under Author Information - one change of word to existing text: He is a Fellow of the American Society of Mechanical Engineers (ASME)........
Elements of Stochastic Process Simulation-Byron S. Gottfried 1984
Stochastic Modelling of Land Cover Dynamic Elements to Assess Landslide Vulnerability-K. Gaurav 2009
Cooperative Effects in Stochastic Models-G. Sh Tsitsiashvili 2005 The monograph is devoted to an investigation of co-operative effects in stochastic models. It includes original results of the authors in the last decade. The main object of the monograph is an analysis of an influence of a stochastic model structure on its characteristics. Problems of a co-operation and a decomposition are actual in a solution of a lot of concrete problems. These problems are: a parallelisation of algorithms and programs, a modelling of supercomputers, computer networks, systems of mobile telephones catastrophes in complex systems, a design and an improvement of technological and economical processes etc. The co-operative effects create a source of significant dependencies between complex system characteristics under large random disturbances. To analyse these effects is necessary to create special methods based on structural analysis of multi-element stochastic models together with majoral asymptotic bounds of these models characteristics. At the same time it demands to develop new approaches to a processing of statistical data and a skill in an usage of the probability theory limit theorems and related asymptotic series and bounds. A choice of the monograph material is defined as by initial applied problems so by probability methods of their solution. Conditionally the monograph may be divided into two parts. First of them contains four sections devoted to a finding of the co-operative effects and to a development of new related analytical and numerical methods. This part has presumably methodological character and creates a theoretical base of an investigation of applied stochastic systems. Second part contains three sections devoted to a solution of different applied problems. It has some interesting substantial results.
Stochastic Models in Operations Research: Stochastic optimization-Daniel P. Heyman 2004-01-01 This two-volume set of texts explores the central facts and ideas of stochastic processes, illustrating their use in models based on applied and theoretical investigations. They demonstrate the interdependence of three areas of study that usually receive separate treatments: stochastic processes, operating characteristics of stochastic systems, and stochastic optimization. Comprehensive in its scope, they emphasize the practical importance, intellectual stimulation, and mathematical elegance of stochastic models and are intended primarily as graduate-level texts.
Deterministic Versus Stochastic Modelling in Biochemistry and Systems Biology-Paola Lecca 2013-04-09 Stochastic kinetic methods are currently considered to be the most realistic and elegant means of representing and simulating the dynamics of biochemical and biological networks. Deterministic versus stochastic modelling in biochemistry and systems biology introduces and critically reviews the deterministic and stochastic foundations of biochemical kinetics, covering applied stochastic process theory for application in the field of modelling and simulation of biological processes at the molecular scale. Following an overview of deterministic chemical kinetics and the stochastic approach to biochemical kinetics, the book goes onto to discuss the specifics of stochastic simulation algorithms,

modelling in systems biology and the structure of biochemical models. Later chapters cover reaction-diffusion systems, and provide an analysis of the Kinfer and BlenX software systems. The final chapter looks at simulation of ecodynamics and food web dynamics. Introduces mathematical concepts and formalisms of deterministic and stochastic modelling through clear and simple examples Presents recently developed discrete stochastic formalisms for modelling biological systems and processes Describes and applies stochastic simulation algorithms to implement a stochastic formulation of biochemical and biological kinetics

Risk Analysis in Finance and Insurance-Alexander Melnikov 2004-06-02 Historically, financial and insurance risks were separate subjects most often analyzed using qualitative methods. The development of quantitative methods based on stochastic analysis is an important achievement of modern financial mathematics, one that can naturally be extended and applied in actuarial mathematics. Risk Analysis in Finance and Insurance offers the first comprehensive and accessible introduction to the ideas, methods, and probabilistic models that have transformed risk management into a quantitative science and led to unified methods for analyzing insurance and finance risks. The author's approach is based on a methodology for estimating the present value of future payments given current financial, insurance, and other information, which leads to proper, practical definitions of the price of a financial contract, the premium for an insurance policy, and the reserve of an insurance company. Self-contained and full of exercises and worked examples, Risk Analysis in Finance and Insurance serves equally well as a text for courses in financial and actuarial mathematics and as a valuable reference for financial analysts and actuaries. Ancillary electronic materials will be available for download from the publisher's Web site. Elements of the Theory of Markov Processes and Their Applications-A. T. Bharucha-Reid 2012-04-26 This graduate-level text and reference in probability, with numerous applications to several fields of science, presents nonmeasure-theoretic introduction to theory of Markov processes. The work also covers mathematical models based on the theory, employed in various applied fields. Prerequisites are a knowledge of elementary probability theory, mathematical statistics, and analysis. Appendixes. Bibliographies. 1960 edition.

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