

## Simulation Methods For Reliability And Availability Of Complex Systems Springer Series In Reliability Engineering

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Simulation Methods for Reliability and Availability of Complex Systems discusses the use of computer simulation-based techniques and algorithms to determine reliability and availability (R and A) levels in complex systems. The book: shares theoretical or applied models and decision support systems that make use of simulation to estimate and to improve system R and A levels, forecasts emerging technologies and trends in the use of computer simulation for R and A and proposes hybrid approaches to the development of efficient methodologies designed to solve R and A-related problems in real-life systems. Dealing with practical issues, Simulation Methods for Reliability and Availability of Complex Systems is designed to support managers and system engineers in the improvement of R and A, as well as providing a thorough exploration of the techniques and algorithms available for researchers, and for advanced undergraduate and postgraduate students.

Monte Carlo simulation is one of the best tools for performing realistic analysis of complex systems as it allows most of the limiting assumptions on system behavior to be relaxed. The Monte Carlo Simulation Method for System Reliability and Risk Analysis comprehensively illustrates the Monte Carlo simulation method and its application to reliability and system engineering. Readers are given a sound understanding of the fundamentals of Monte Carlo sampling and simulation and its application for realistic system modeling. Whilst many of the topics rely on a high-level understanding of calculus, probability and statistics, simple academic examples will be provided in support to the explanation of the theoretical foundations to facilitate comprehension of the subject matter. Case studies will be introduced to provide the practical value of the most advanced techniques. This detailed approach makes The Monte Carlo Simulation Method for System Reliability and Risk Analysis a key reference for senior undergraduate and graduate students as well as researchers and practitioners. It provides a powerful tool for all those involved in system analysis for reliability, maintenance and risk evaluations.

This book illustrates a number of modelling and computational techniques for addressing relevant issues in reliability and risk analysis. In particular, it provides: i) a basic illustration of some methods used in reliability and risk analysis for modelling the stochastic failure and repair behaviour of systems, e.g. the Markov and Monte Carlo simulation methods; ii) an introduction to Genetic Algorithms, tailored to their application for RAMS (Reliability, Availability, Maintainability and Safety) optimization; iii) an introduction to key issues of system reliability and risk analysis, like dependent failures and importance measures; and iv) a presentation of the issue of uncertainty and of the techniques of sensitivity and uncertainty analysis used in support of reliability and risk analysis. The book provides a technical basis for senior undergraduate or graduate courses and a reference for researchers and practitioners in the field of reliability and risk analysis. Several practical examples are included to demonstrate the application of the concepts and techniques in practice.

The application of quantitative reliability evaluation in electric power systems has now evolved to the point at which most utilities use these techniques in one or more areas of their planning, design, and operation. Most of the techniques in use are based on analytical models and resulting analytical evaluation procedures. Improvements in and availability of high-speed digital computers have created the opportunity to analyze many of these problems using stochastic simulation methods and over the last decade there has been increased interest in and use made of Monte Carlo simulation in quantitative power system reliability assessment. Monte Carlo simulation is not a new concept and recorded applications have existed for at least 50 yr. However, localized high-speed computers with large-capacity storage have made Monte Carlo simulation an available and sometimes preferable option for many power system reliability applications. Monte Carlo simulation is also an integral part of a modern undergraduate or graduate course on reliability evaluation of general engineering systems or specialized areas such as electric power systems. It is hoped that this textbook will help formalize the many existing applications of Monte Carlo simulation and assist in their integration in teaching programs. This book presents the basic concepts associated with Monte Carlo simulation.

Amstat News asked three review editors to rate their top five favorite books in the September 2003 issue. Statistical Methods for Reliability Data was among those chosen. Bringing statistical methods for reliability testing in line with the computer age This volume presents state-of-the-art, computer-based statistical methods for reliability data analysis and test planning for industrial products. Statistical Methods for Reliability Data updates and improves established techniques as it demonstrates how to apply the new graphical, numerical, or simulation-based methods to a broad range of models encountered in reliability data analysis. It includes methods for planning reliability studies and analyzing degradation data, simulation methods used to complement large-sample asymptotic theory, general likelihood-based methods of handling arbitrarily censored data and truncated data, and more. In this book, engineers and statisticians in industry and academia will find: A wealth of information and procedures developed to give products a competitive edge Simple examples of data analysis computed with the S-PLUS system-for which a suite of functions and commands is available over the Internet End-of-chapter, real-data exercise sets Hundreds of computer graphics illustrating data, results of analyses, and technical concepts An essential resource for practitioners involved in product reliability and design decisions, Statistical Methods for Reliability Data is also an excellent textbook for on-the-job training courses, and for university courses on applied reliability data analysis at the graduate level. An Instructor's Manual presenting detailed solutions to all the problems in the book is available upon request from the Wiley editorial department.

Gas discharge plasma is the most common type of low-temperature plasma, with a large number of practical applications covering almost all areas of modern science and technology. This book is an introduction to the numerical modeling methods for gas discharge plasmas. It is intended to assist and direct graduate students and junior researchers, whose research activity deals with computational plasma physics. Topics covered include the essentials of basic modelling approaches (particle, fluid, and hybrid) for gas discharges, and the implementation of these methods with examples of glow (DC and RF) discharges. Numerical studies of nonlinear dynamics and formation of spatio-temporal patterns in gas discharge systems are also presented. Key Features Focuses solely on gas discharge plasmas Covers basic modelling techniques, including particle, fluid, and hybrid Provides details of applications and implementation for the considered methods Special emphasis is given to the applicability and reliability of different modelling techniques Provides specific examples of numerical simulations of the gas discharge plasmas

The need for a comprehensive book on probabilistic structural mechanics that brings together the many analytical and computational methods developed over the years and their applications in a wide spectrum of industries—from residential buildings to nuclear power plants, from bridges to pressure vessels, from steel structures to ceramic structures—became evident from the many discussions the editor had with practising engineers, researchers and professors. Because no single individual has the expertise to write a book with such a diverse scope, a group of 39 authors from universities, research laboratories, and industries from six countries in three continents was invited to write 30 chapters covering the various aspects of probabilistic structural mechanics. The editor and the authors believe that this handbook will serve as a reference text to practising engineers, teachers, students and researchers. It may also be used as a textbook for graduate-level courses in probabilistic structural mechanics. The editor wishes to thank the chapter authors for their contributions. This handbook would not have been a reality without their collaboration.

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