Reliability Modeling And Analysis Of Smart Power Systems Reliable And Sustainable Electric Power And Energy Systems Management

Reliability Modeling: The RIAC Guide to Reliability Prediction, Assessment and EstimationRepairable Systems Reliability AnalysisThe Monte Carlo Simulation Method for System Reliability and Risk AnalysisPerformance and Reliability Analysis of Computer SystemsReliability Modeling and Analysis of Flicker Noise for Pore Structure in Amorphous Chalcogenide-based Phase-change Memory DevicesGeneration Reliability Modeling and Analysis of Wind Power PlantsModeling for Reliability AnalysisPrinciples of Performance and Reliability Modeling and EvaluationDynamic System ReliabilityLong-Term Reliability of Nanometer VLSI SystemsReliability ModellingModeling and Simulation Based Analysis in Reliability EngineeringReliability Modeling, Analysis and OptimizationReliabilityReliability Analysis of Dynamic SystemsElectric Power Grid Reliability EvaluationGas and Oil Reliability EngineeringRisk and Reliability Analysis: Theory and ApplicationsUsing the Weibull DistributionSystem Reliability ManagementReliability Modeling With Computer And Maintenance ApplicationsReliability and Availability EngineeringReliability Modeling and Analysis of Smart Power SystemsThe Handbook of Reliability,

Maintenance, and System Safety through Mathematical ModelingTest and Analysis of Web ServicesSoftware Reliability ModellingStochastic Modeling for ReliabilityStochastic Models in Reliability EngineeringReliability Modeling, Analysis and OptimizationBasic Reliability Engineering AnalysisOptimal Reliability ModelingStochastic Reliability Modeling, Optimization and ApplicationsProbabilistic Physics of Failure Approach to ReliabilityAdvances in System Reliability EngineeringFailure Rate Modelling for Reliability and RiskAdvanced Reliability Modeling IIReliability and Safety EngineeringReliability Modelling and Analysis in Discrete TimeSystems EngineeringSoftware Reliability Modeling

Reliability Modeling: The RIAC Guide to Reliability Prediction, Assessment and Estimation

Software reliability is one of the most important characteristics of software product quality. Its measurement and management technologies during the software product life cycle are essential to produce and maintain quality/reliable software systems. Part 1 of this book introduces several aspects of software reliability modeling and its applications. Hazard rate and nonhomogeneous Poisson process (NHPP) models are investigated particularly for quantitative software reliability assessment. Further, imperfect debugging and software availability models are discussed with

reference to incorporating practical factors of dynamic software behavior. Three software management problems are presented as application technologies of software reliability models: the optimal software release problem, the statistical testing-progress control, and the optimal testing-effort allocation problem. Part 2 of the book describes several recent developments in software reliability modeling and their applications as quantitative techniques for software quality/reliability measurement and assessment. The discussion includes a quality engineering analysis of human factors affecting software reliability during the design review phase, which is the upper stream of software development, as well as software reliability growth models based on stochastic differential equations and discrete calculus during the testing phase, which is the lower stream. The final part of the book provides an illustration of quality-oriented software management analysis by applying the multivariate analysis method and the existing software reliability growth models to actual process monitoring data.

Repairable Systems Reliability Analysis

The reliability impact of wind generation is evaluated using a set of reliability modeling and analysis tools implemented with MATLAB. As expected, the addition of wind generation increases the reliability of a power system. However, the extent to which the reliability is increase varies with the wind farm's penetration level. Using the LOLE, it is shown that as more wind generation is added to a power system the increase in

reliability diminishes. Nonetheless, wind generators improved the reliability of a power system and deserve to be granted capacity credits. The ELCC method is used to calculate the capacity credit of wind generators. Capacity credits values between 16% and 32% were computed and correlate with the results of comparable studies. Capacity credit of wind farms also diminished with increasing penetration level.

The Monte Carlo Simulation Method for System Reliability and Risk Analysis

Learn about the techniques used for evaluating the reliability and availability of engineered systems with this comprehensive guide.

Performance and Reliability Analysis of Computer Systems

Reliability Modeling and Analysis of Flicker Noise for Pore Structure in Amorphous Chalcogenide-based Phase-change Memory Devices

"Markov modeling has long been accepted as a fundamental and powerful technique for the fault tolerance analysis of mission-critical applications. However, the elaborate computations required have often made Markov modeling too time-consuming to be of practical use on these complex systems. With

this hands-on tool, designers can use the Markov modeling technique to analyze safety, reliability, maintainability, and cost-effectiveness factors in the full range of complex systems in use today. Featuring ground-breaking simulation software and a comprehensive reference manual, MARKOV MODELING FOR RELIABILITY ANALYSIS helps system designers surmount the mathematical computations that have previously prevented effective reliability analysis. The text and software compose a valuable self-study tool that is complete with detailed explanations, examples, and a library of Markov models that can be used for experiments and as derivations for new simulation models. The book details how these analyses are conducted, while providing hands-on instruction on how to develop reliability models for the full range of system configurations. Computer-Aided Rate Modeling and Simulation (CARMS) software is an integrated modeling tool that includes a diagram-based environment for model setup, a spreadsheet like interface for data entry, an expert system link for automatic model construction, and an interactive graphic interface for displaying simulation results."

Generation Reliability Modeling and Analysis of Wind Power Plants

Promotes better ways to diagnose, maintain, and improve existing systems. Existing reliability evaluation models are examined with respect to today's complicated engineering systems that have hundreds of thousands of integrated component

designs.

Modeling for Reliability Analysis

Reliability and safety are core issues that must be addressed throughout the life cycle of engineering systems. Reliability and Safety Engineering presents an overview of the basic concepts, together with simple and practical illustrations. The authors present reliability terminology in various engineering fields, viz., electronics engineering, software engineering, mechanical engineering, structural engineering and power systems engineering. The book describes the latest applications in the area of probabilistic safety assessment, such as technical specification optimization, risk monitoring and risk informed in-service inspection. Reliability and safety studies must, inevitably, deal with uncertainty, so the book includes uncertainty propagation methods: Monte Carlo simulation, fuzzy arithmetic, Dempster-Shafer theory and probability bounds. Reliability and Safety Engineering also highlights advances in system reliability and safety assessment including dynamic system modeling and uncertainty management. Case studies from typical nuclear power plants as well as from structural, software and electronic systems are also discussed. Reliability and Safety Engineering combines discussions of the existing literature on basic concepts and applications with state-of-the-art methods used in reliability and risk assessment of engineering systems. It is designed to assist practicing engineers, students and researchers in the areas of reliability engineering and risk analysis.

Principles of Performance and Reliability Modeling and Evaluation

The intent of this book is to provide guidance on modeling techniques that can be used to quantify the reliability of a product or system. In this context, reliability modeling is the process of constructing a mathematical model that is used to estimate the reliability characteristics of a product. There are many ways in which this can be accomplished, depending on the product or system and the type of information that is available, or practical to obtain. This book reviews possible approaches, summarizes their advantages and disadvantages, and provides guidance on selecting a methodology based on the specific goals and constraints of the analyst. While this book will not discuss the use of specific published methodologies, in cases where examples are provided, tools and methodologies with which the author has personal experience in their development are used, such as life modeling, NPRD, MIL-HDBK-217 and the RIAC 217Plus--Introduction.

Dynamic System Reliability

Recent developments in reliability engineering has become the most challenging and demanding area of research. Modeling and Simulation, along with System Reliability Engineering has become a greater issue because of high-tech industrial processes, using more complex systems today. This book gives the latest research advances in the field of modeling and simulation, based on analysis in engineering sciences.

Features Focuses on the latest research in modeling and simulation based analysis in reliability engineering. Covers performance evaluation of complex engineering systems Identifies and fills the gaps of knowledge pertaining to engineering applications Provides insights on an international and transnational scale Modeling and Simulation Based Analysis in Reliability Engineering aims at providing a reference for applications of mathematics in engineering, offering a theoretical sound background with adequate case studies, and will be of interest to researchers, practitioners, and academics.

Long-Term Reliability of Nanometer VLSI Systems

Performance and Reliability Analysis of Computer Systems: An Example-Based Approach Using the SHARPE Software Package provides a variety of probabilistic, discrete-state models used to assess the reliability and performance of computer and communication systems. The models included are combinatorial reliability models (reliability block diagrams, fault trees and reliability graphs), directed, acyclic task precedence graphs, Markov and semi-Markov models (including Markov reward models), product-form queueing networks and generalized stochastic Petri nets. A practical approach to system modeling is followed; all of the examples described are solved and analyzed using the SHARPE tool. In structuring the book, the authors have been careful to provide the reader with a methodological approach to analytical modeling techniques. These techniques are

not seen as alternatives but rather as an integral part of a single process of assessment which, by hierarchically combining results from different kinds of models, makes it possible to use state-space methods for those parts of a system that require them and non-state-space methods for the more well-behaved parts of the system. The SHARPE (Symbolic Hierarchical Automated Reliability and Performance Evaluator) package is the `toolchest' that allows the authors to specify stochastic models easily and solve them quickly, adopting model hierarchies and very efficient solution techniques. All the models described in the book are specified and solved using the SHARPE language; its syntax is described and the source code of almost all the examples discussed is provided. Audience: Suitable for use in advanced level courses covering reliability and performance of computer and communications systems and by researchers and practicing engineers whose work involves modeling of system performance and reliability.

Reliability Modelling

Focusing on shocks modeling, burn-in and heterogeneous populations, Stochastic Modeling for Reliability naturally combines these three topics in the unified stochastic framework and presents numerous practical examples that illustrate recent theoretical findings of the authors. The populations of manufactured items in industry are usually heterogeneous. However, the conventional reliability analysis is performed under the implicit assumption of

homogeneity, which can result in distortion of the corresponding reliability indices and various misconceptions. Stochastic Modeling for Reliability fills this gap and presents the basics and further developments of reliability theory for heterogeneous populations. Specifically, the authors consider burn-in as a method of elimination of 'weak' items from heterogeneous populations. The real life objects are operating in a changing environment. One of the ways to model an impact of this environment is via the external shocks occurring in accordance with some stochastic point processes. The basic theory for Poisson shock processes is developed and also shocks as a method of burn-in and of the environmental stress screening for manufactured items are considered. Stochastic Modeling for Reliability introduces and explores the concept of burn-in in heterogeneous populations and its recent development, providing a sound reference for reliability engineers, applied mathematicians, product managers and manufacturers alike.

Modeling and Simulation Based Analysis in Reliability Engineering

Recent Advances in System Reliability Engineering describes and evaluates the latest tools, techniques, strategies, and methods in this topic for a variety of applications. Special emphasis is put on simulation and modelling technology which is growing in influence in industry, and presents challenges as well as opportunities to reliability and systems engineers. Several manufacturing engineering applications are

addressed, making this a particularly valuable reference for readers in that sector. Contains comprehensive discussions on state-of-the-art tools, techniques, and strategies from industry Connects the latest academic research to applications in industry including system reliability, safety assessment, and preventive maintenance Gives an in-depth analysis of the benefits and applications of modelling and simulation to reliability

Reliability Modeling, Analysis and Optimization

Reliability

This book presents the latest key research into the performance and reliability aspects of dependable fault-tolerant systems and features commentary on the fields studied by Prof. Kishor S. Trivedi during his distinguished career. Analyzing system evaluation as a fundamental tenet in the design of modern systems, this book uses performance and dependability as common measures and covers novel ideas, methods, algorithms, techniques, and tools for the in-depth study of the performance and reliability aspects of dependable fault-tolerant systems. It identifies the current challenges that designers and practitioners must face in order to ensure the reliability, availability, and performance of systems, with special focus on their dynamic behaviors and dependencies, and provides system researchers, performance analysts, and practitioners with the tools to address

these challenges in their work. With contributions from Prof. Trivedi's former PhD students and collaborators, many of whom are internationally recognized experts, to honor him on the occasion of his 70th birthday, this book serves as a valuable resource for all engineering disciplines, including electrical, computer, civil, mechanical, and industrial engineering as well as production and manufacturing.

Reliability Analysis of Dynamic Systems

The advent of reliability engineering tools coupled with the cost of oil and gas operations has changed the paradigm of maintenance technology. A simple strategy of efficient replacement of failed equipment/component has been transformed into a more complex but proactive approach for keeping equipment running at peak efficiency concept of "total process" reliability engineering and maintenance. Applied Oil and Gas Reliability Engineering: Modeling and Analysis is the first book to apply reliability value improvement practices and process enterprises lifecycle analysis to the Oil and gas Industry. With this book in hand, engineers also gain a powerful guide to the most commonly used software modeling tools which aid in the planning and execution of an effective maintenance program. Easy to understand, the book identifies equipment and procedural problems inherent to oil and gas operations then applied a systematic approach for solving them. In this book, the author combines qualitative and quantitative methods with powerful software modeling tools to assist engineers in

formulating a custom maintenance policy which will ensure process efficiency, reduce projects cost, reduce redundancies and optimum equipment replacement time. Mathematic methods for analyzing failure historical data Instruction for utilizing modeling systems such as MAROS, TARO, and BLOCKSIM and interpret results Step by Step approach for formulating an cost effective maintenance program Identifies equipment and procedural problems inherent to oil and gas operations Easily understood methods and software tools that will save time and money Provides a tutorial for using the most used software programs such as: MAROS, TARO, and BLOCKSIM Step by step instruction to create a custom maintenance policy Reduce project cost, reduce redundancies and optimize equipment life

Electric Power Grid Reliability Evaluation

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.

Gas and Oil Reliability Engineering

Offers timely and comprehensive coverage of dynamic system reliability theory This book focuses on hot issues of dynamic system reliability, systematically introducing the reliability modeling and analysis methods for systems with imperfect fault coverage, systems with function dependence, systems subject to deterministic or probabilistic common-cause failures, systems subject to deterministic or probabilistic competing failures, and dynamic standby sparing systems. It presents recent developments of such extensions involving reliability modelling theory, reliability evaluation methods, and features numerous case studies based on real-world examples. The presented dynamic reliability theory can enable a more accurate representation of actual complex system behavior, thus more effectively guiding the reliable design of real-world critical systems. Dynamic System Reliability: Modelling and Analysis of Dynamic and Dependent Behaviors begins by describing the evolution from the traditional static

reliability theory to the dynamic system reliability theory, and provides a detailed investigation of dynamic and dependent behaviors in subsequent chapters. Although written for those with a background in basic probability theory and stochastic processes, the book includes a chapter reviewing the fundamentals that readers need to know in order to understand contents of other chapters which cover advanced topics in reliability theory and case studies. The first book systematically focusing on dynamic system reliability modelling and analysis theory Provides a comprehensive treatment on imperfect fault coverage (single-level/multi-level or modular), function dependence, common cause failures (deterministic and probabilistic), competing failures (deterministic and probabilistic), and dynamic standby sparing Includes abundant illustrative examples and case studies based on real-world systems Covers recent advances in combinatorial models and algorithms for dynamic system reliability analysis Offers a rich set of references, providing helpful resources for readers to pursue further research and study of the topics Dynamic System Reliability: Modelling and Analysis of Dynamic and Dependent Behaviors is an excellent book for undergraduate and graduate students, and engineers and researchers in reliability and related disciplines.

Risk and Reliability Analysis: Theory and Applications

The volume presents the research work in understanding, modeling and quantifying the risks

associated with different ways of implementing smart grid technology in power systems in order to plan and operate a modern power system with an acceptable level of reliability. Power systems throughout the world are undergoing significant changes creating new challenges to system planning and operation in order to provide reliable and efficient use of electrical energy. The appropriate use of smart grid technology is an important drive in mitigating these problems and requires considerable research activities, some of which (by researchers from academia and industry) are included in this volume: the reliability appraisal of smart grid technologies and their applications, micro-grids, assessment of plug-in hybrid vehicles and the system effects, smart system protection and reliability evaluation, demand response and smart maintenance of power system equipment.

Using the Weibull Distribution

This book provides the latest research advances in the field of system reliability assurance and engineering. It contains reference material for applications of reliability in system engineering, offering a theoretical sound background with adequate numerical illustrations. Included are concepts pertaining to reliability analysis, assurance techniques and methodologies, tools, and practical applications of system reliability modeling and allocation. The collection discusses various soft computing techniques like artificial intelligence and particle swarm optimization approach for reliability assessment. Importance of differentiating between

the optimal release time and testing stop time of the software has been explicitly discussed and presented in the book. Features: Creates understanding of the costs associated with complex systems Covers reliability measurement of engineering systems Incorporates an efficient effort-based expenditure policy incorporating cost and reliability criteria Provides information for optimal testing stop and release time of software system Presents software performance and security layout Addresses reliability prediction and its maintenance through advanced analytics techniques Overall, System Reliability Management: Solutions and Techniques is a collaborative and interdisciplinary approach for better communication of problems and solutions to increase the performance of the system for better utilization and resource management.

System Reliability Management

This book presents a unique collection of contributions from some of the foremost scholars in the field of risk and reliability analysis. Combining the most advanced analysis techniques with practical applications, it is one of the most comprehensive and up-to-date books available on risk-based engineering. All the fundamental concepts needed to conduct risk and reliability assessments are covered in detail, providing readers with a sound understanding of the field and making the book a powerful tool for students and researchers alike. This book was prepared in honor of Professor Armen Der Kiureghian, one of the fathers of modern risk and reliability analysis.

Reliability Modeling With Computer And Maintenance Applications

Featuring aerospace examples and applications, Reliability Analysis of Dynamic Systems presents the very latest probabilistic techniques for accurate and efficient dynamic system reliability analysis. While other books cover more broadly the reliability techniques and challenges related to large systems, Dr Bin Wu presents a focused discussion of new methods particularly relevant to the reliability analysis of large aerospace systems under harmonic loads in the low frequency range. Developed and written to help you respond to challenges such as non-linearity of the failure surface, intensive computational costs and complexity in your dynamic system, Reliability Analysis of Dynamic Systems is a specific, detailed and application-focused reference for engineers, researchers and graduate students looking for the latest modeling solutions. The Shanghai Jiao Tong University Press Aerospace Series publishes titles that cover the latest advances in research and development in aerospace. Its scope includes theoretical studies, design methods, and real-world implementations and applications. The readership for the series is broad, reflecting the wide range of aerospace interest and application, but focuses on engineering. Forthcoming titles in the Shanghai Jiao Tong University Press Aerospace Series: Reliability Analysis of Dynamic Systems • Wake Vortex Control • Aeroacoustics: Fundamentals and Applications in Aeropropulsion Systems • Computational Intelligence in Aerospace Design •

Unsteady Flow and Aeroelasticity in Turbomachinery Authored by a leading figure in Chinese aerospace with 20 years' professional experience in reliability analysis and engineering simulation. Offers solutions to the challenges of non-linearity, intensive computational cost and complexity in reliability assessment. Aerospace applications and examples used throughout to illustrate accuracy and efficiency achieved with new methods.

Reliability and Availability Engineering

This book is a collective work by many leading scientists, analysts, mathematicians, and engineers who have been working at the front end of reliability science and engineering. The book covers conventional and contemporary topics in reliability science, all of which have seen extended research activities in recent years. The methods presented in this book are real-world examples that demonstrate improvements in essential reliability and availability for industrial equipment such as medical magnetic resonance imaging, power systems, traction drives for a search and rescue helicopter, and air conditioning systems. The book presents real case studies of redundant multi-state air conditioning systems for chemical laboratories and covers assessments of reliability and fault tolerance and availability calculations. Conventional and contemporary topics in reliability engineering are discussed, including degradation, networks, and dynamic reliability, resilience, and multi-state systems, all of which are relatively new topics to the field. The book is aimed at

engineers and scientists, as well as postgraduate students involved in reliability design, analysis, and experiments and applied probability and statistics.

Reliability Modeling and Analysis of Smart Power Systems

Reliability Modelling and Analysis in Discrete Time provides an overview of the probabilistic and statistical aspects connected with discrete reliability systems. This engaging book discusses their distributional properties and dependence structures before exploring various orderings associated between different reliability structures. Though clear explanations, multiple examples, and exhaustive coverage of the basic and advanced topics of research in this area, the work gives the reader a thorough understanding of the theory and concepts associated with discrete models and reliability structures. A comprehensive bibliography assists readers who are interested in further research and understanding. Requiring only an introductory understanding of statistics, this book offers valuable insight and coverage for students and researchers in Probability and Statistics, Electrical Engineering, and Reliability/Quality Engineering. The book also includes a comprehensive bibliography to assist readers seeking to delve deeper. Includes a valuable introduction to Reliability Theory before covering advanced topics of research and real world applications Features an emphasis on the mathematical theory of reliability modeling Provides many illustrative examples to foster reader

understanding

The Handbook of Reliability, Maintenance, and System Safety through Mathematical Modeling

A substantial amount of research has been conducted on consecutive k-out-of-n and related reliability systems over the past four decades. These systems have been used to model various engineering systems such as the microwave stations of telecoms network, oil pipeline systems, and vacuum systems in an electron accelerator. As such, studies of reliability properties of consecutive k-out-of-n structures have attracted significant attention from both theoretical and practical approaches. In the modern era of technology, the redundancies are employed in the various industrial systems to prevent them from failure/sudden failure or to recover from failures. This book is meant to provide knowledge and help engineers and academicians in understanding reliability engineering by using k-out-of-n structures. The material is also targeted at postgraduate or senior undergraduate students pursuing reliability engineering.

Test and Analysis of Web Services

The authors have here put together the first reference on all aspects of testing and validating service-oriented architectures. With contributions by leading academic and industrial research groups it offers detailed guidelines for the actual validation process.

Readers will find a comprehensive survey of state-of-the-art approaches as well as techniques and tools to improve the quality of service-oriented applications. It also includes references and scenarios for future research and development.

Software Reliability Modelling

"Failure Rate Modeling for Reliability and Risk" focuses on reliability theory, and to the failure rate (hazard rate, force of mortality) modeling and its generalizations to systems operating in a random environment and to repairable systems. The failure rate is one of the crucial probabilistic characteristics for a number of disciplines; including reliability, survival analysis, risk analysis and demography. The book presents a systematic study of the failure rate and related indices, and covers a number of important applications where the failure rate plays the major role. Applications in engineering systems are studied, together with some actuarial, biological and demographic examples. The book provides a survey of this broad and interdisciplinary subject which will be invaluable to researchers and advanced students in reliability engineering and applied statistics, as well as to demographers, econometricians, actuaries and many other mathematically oriented researchers.

Stochastic Modeling for Reliability

Reliability is an essential concept in mathematics, computing, research, and all disciplines of

engineering, and reliability as a characteristic is, in fact, a probability. Therefore, in this book, the author uses the statistical approach to reliability modelling along with the MINITAB software package to provide a comprehensive treatment of modelling, from the basics through advanced modelling techniques.The book begins by presenting a thorough grounding in the elements of modelling the lifetime of a single, non-repairable unit. Assuming no prior knowledge of the subject, the author includes a guide to all the fundamentals of probability theory, defines the various measures associated with reliability, then describes and discusses the more common lifetime models: the exponential, Weibull, normal, lognormal and gamma distributions. She concludes the groundwork by looking at ways of choosing and fitting the most appropriate model to a given data set, paying particular attention to two critical points: the effect of censored data and estimating lifetimes in the tail of the distribution.The focus then shifts to topics somewhat more difficult:the difference in the analysis of lifetimes for repairable versus non-repairable systems and whether repair truly ""renews"" the systemmethods for dealing with system with reliability characteristic specified for more than one component or subsystemthe effect of different types of maintenance strategiesthe analysis of life test dataThe final chapter provides snapshot introductions to a range of advanced models and presents two case studies that illustrate various ideas from throughout the book.

Stochastic Models in Reliability

The Handbook of Reliability, Maintenance, and System Safety through Mathematical Modeling discusses the many factors affect reliability and performance, including engineering design, materials, manufacturing, operations, maintenance, and many more. Reliability is one of the fundamental criteria in engineering systems design, with maintenance serving as a way to support reliability throughout a system's life. Addressing these issues requires information, modeling, analysis and testing. Different techniques are proposed and implemented to help readers analyze various behavior measures (in terms of the functioning and performance) of systems. Enables mathematicians to convert any process or system into a model that can be analyzed through a specific technique Examines reliability and mathematical modeling in a variety of disciplines, unlike competitors which typically examine only one Includes a table of contents with simple to complex examples, starting with basic models and then refining modeling approaches step-by-step

Reliability Modeling, Analysis and Optimization

This book provides readers with a detailed reference regarding two of the most important long-term reliability and aging effects on nanometer integrated systems, electromigrations (EM) for interconnect and biased temperature instability (BTI) for CMOS devices. The authors discuss in detail recent developments in

the modeling, analysis and optimization of the reliability effects from EM and BTI induced failures at the circuit, architecture and system levels of abstraction. Readers will benefit from a focus on topics such as recently developed, physics-based EM modeling, EM modeling for multi-segment wires, new EM-aware power grid analysis, and system level EM-induced reliability optimization and management techniques. Reviews classic Electromigration (EM) models, as well as existing EM failure models and discusses the limitations of those models; Introduces a dynamic EM model to address transient stress evolution, in which wires are stressed under time-varying current flows, and the EM recovery effects. Also includes new, parameterized equivalent DC current based EM models to address the recovery and transient effects; Presents a cross-layer approach to transistor aging modeling, analysis and mitigation, spanning multiple abstraction levels; Equips readers for EM-induced dynamic reliability management and energy or lifetime optimization techniques, for many-core dark silicon microprocessors, embedded systems, lower power many-core processors and datacenters.

Basic Reliability Engineering Analysis

The groundbreaking book that details the fundamentals of reliability modeling and evaluation and introduces new and future technologies Electric Power Grid Reliability Evaluation deals with the effective evaluation of the electric power grid and explores the role that this process plays in the

planning and designing of the expansion of the power grid. The book is a guide to the theoretical approaches and processes that underpin the electric power grid and reviews the most current and emerging technologies designed to ensure reliability. The authors—noted experts in the field—also present the algorithms that have been developed for analyzing the soundness of the power grid. A comprehensive resource, the book covers probability theory, stochastic processes, and a frequency-based approach in order to provide a theoretical foundation for reliability analysis. Throughout the book, the concepts presented are explained with illustrative examples that connect with power systems. The authors cover generation adequacy methods, and multi-node analysis which includes both multi-area as well as composite power system reliable evaluation. This important book: • Provides a guide to the basic methods of reliability modeling and evaluation • Contains a helpful review of the background of power system reliability evaluation • Includes information on new technology sources that have the potential to create a more reliable power grid • Addresses renewable energy sources and shows how they affect power outages and blackouts that pose new challenges to the power grid system Written for engineering students and professionals, Electric Power Grid Reliability Evaluation is an essential book that explores the processes and algorithms for creating a sound and reliable power grid.

Optimal Reliability Modeling

Understand and utilize the latest developments in Weibull inferential methods While the Weibull distribution is widely used in science and engineering, most engineers do not have the necessary statistical training to implement the methodology effectively. Using the Weibull Distribution: Reliability, Modeling, and Inference fills a gap in the current literature on the topic, introducing a self-contained presentation of the probabilistic basis for the methodology while providing powerful techniques for extracting information from data. The author explains the use of the Weibull distribution and its statistical and probabilistic basis, providing a wealth of material that is not available in the current literature. The book begins by outlining the fundamental probability and statistical concepts that serve as a foundation for subsequent topics of coverage, including: • Optimum burn-in, age and block replacement, warranties and renewal theory • Exact inference in Weibull regression • Goodness of fit testing and distinguishing the Weibull from the lognormal • Inference for the Three Parameter Weibull Throughout the book, a wealth of real-world examples showcases the discussed topics and each chapter concludes with a set of exercises, allowing readers to test their understanding of the presented material. In addition, a related website features the author's own software for implementing the discussed analyses along with a set of modules written in Mathcad®, and additional graphical interface software for performing simulations. With its numerous hands-on examples, exercises, and software applications, Using the Weibull Distribution is an excellent book for courses on quality control and reliability engineering at the

upper-undergraduate and graduate levels. The book also serves as a valuable reference for engineers, scientists, and business analysts who gather and interpret data that follows the Weibull distribution

Stochastic Reliability Modeling, Optimization and Applications

BASIC Reliability Engineering Analysis describes reliability activities as they occur during an industrial development cycle. Reliability as a function of time is discussed, along with systems modeling, predicting and estimating reliability, and quality assurance. This book is comprised of seven chapters and begins with a brief introduction to the BASIC computer language used in the programs in the text. The second chapter describes the way reliability is taken into account in different parts of the development cycle, while the third chapter discusses the basic concepts of reliability as a function of time, failure rate, and some basic statistical concepts. The fourth chapter deals with the modeling of complex systems and related topics such as availability and maintainability. The fifth chapter describes the activities that can go on early in the development cycle, while the sixth chapter gives some of the techniques that can be used to analyze data generated during development or later in the cycle when equipment is in use. The final chapter offers a brief look at quality assurance and acquaints the reader with the concepts involved, using inspection by attributes to introduce the ideas. This monograph is intended for engineers or managers with a particular interest in reliability, as

well as for engineering undergraduates.

Probabilistic Physics of Failure Approach to Reliability

Bringing together business and engineering to reliability analysisWith manufactured products exploding in numbers and complexity,reliability studies play an increasingly critical role throughout aproduct's entire life cycle-from design to post-sale support.Reliability: Modeling, Prediction, and Optimization presents aremarkably broad framework for the analysis of the technical andcommercial aspects of product reliability, integrating concepts andmethodologies from such diverse areas as engineering, materialsscience, statistics, probability, operations research, andmanagement. Written in plain language by two highly respectedexperts in the field, this practical work provides engineers,operations managers, and applied statisticians with bothqualitative and quantitative tools for solving a variety ofcomplex, real-world reliability problems. A wealth of examples andcase studies accompanies: * Comprehensive coverage of assessment, prediction, and improvementat each stage of a product's life cycle * Clear explanations of modeling and analysis for hardware rangingfrom a single part to whole systems * Thorough coverage of test design and statistical analysis ofreliability data * A special chapter on software reliability * Coverage of effective management of reliability, product support,testing, pricing, and related topics * Lists of sources for technical information, data, and

computerprograms * Hundreds of graphs, charts, and tables, as well as over 500references * PowerPoint slides are available from the Wiley editorialdepartment.

Advances in System Reliability Engineering

The development of Reliability and Maintenance theory and applications has become major concerns of engineers and managers engaged in order to design and product systems that are highly reliable. This book aims to cover the ongoing research topics in computer system, reliability analysis, reliability applications and maintenance policies, so as to provide awareness for those who engage systems design, being students, technicians, or research engineers, as a reference guidebook.

Failure Rate Modelling for Reliability and Risk

Abstract: Phase-change memory (PCM) devices are one of the most promising memory devices to replace the flash memory devices in terms of both scalability and performances. However, typically high programming current to operate devices is a fatal problem in comparison with flash memory. Therefore, many studies have been investigated by changing the contact area and optimizing the structure. In addition, in perspective of characteristic of reliability, the drift and noise are the important problem to degrade the characteristic of devices and the flicker noise is one of

the crucial factors in amorphous chalcogenide-based PCM devices. In this paper, we examined the pore-like structure, which is one of the promising structures having small reset current, comparing with conventional mushroom structure by the device reliability analysis for flicker noise using TCAD modeling and simulation. Highlights: Analysis of methodology for reset current reduction of PCM in view of reliability Flicker noise induces read disturbance in the device operation resulting in degradation. The trade-off between reducing reset current and improving reliability Reducing contact area degrades PCM device reliability. Device structure design influences PCM device reliability.

Advanced Reliability Modeling II

This book summarizes the recent advances in software reliability modelling. Almost all the existing models are classified and the most interesting models are described in detail.Because of the application of software in many industrial, military and commercial systems, software reliability has become an important research area. Although there are many models and results appeared in different journals and conference proceedings, there is a lack of systematic publications on this subject. The aim of this book is to provide an overview of this area and provide software reliability researchers and analysts with a systematic study of the existing results. This book can also be used as a reference book for other software engineers and reliability theoreticians interested in this area.

Reliability and Safety Engineering

Most of the reliability literature is directed towards non repairable systems, that is, systems that fail are discarded. This book is mainly dedicated towards providing coverage to the reliability modeling and analysis of repairable systems that are repaired and not replaced when they fail. Most of the equipment - mechanical or otherwise -are repairable and are subjected to maintenance actions- reactive or proactive- at various levels. Maintenance actions are carried out either to preserve a system or to renovate it to a specified functionable state. Maintenance actions are also characterized by the degree (perfect or imperfect) to which a system can be restored, i.e., to an 'as good as new condition' (AGAN), or 'as bad as old condition' (ABAO). Mathematically perfect repair is modeled using a renewal process (RP). Since it represents much idealized situation, this model has restricted applications in the analysis of repairable systems. At the other extreme, the ABAO repair is mathematically modelled using a Non-Homogenous Poisson Process (NHPP). These assumptions are very unrealistic for probabilistic modeling and leads to major distortions in statistical analysis. This unique book provides a comprehensive framework for the modeling and analysis of repairable systems considering both the non- parametric and parametric approaches to deal with the failure data. The book presents MCF based non-parametric approach with several illustrative examples and the generalized renewal process (GRP) based arithmetic reduction of age (ARA) models along with its applications to the

systems failure data from aviation industry. The book also covers various multi-criteria decision-making (MCDM), integrated with repairable systems reliability analysis models to provide a much better insight into imperfect repair and maintenance data analysis. A complete chapter on an integrated framework for procurement process is added which will of a great assistance to the readers in enhancing the potential of their respective organization. This book also presents FMEA methods tailored for GRP based repairs. This text has primarily emerged from the industrial experience and research work of the authors. A number of illustrations have been included to make the subject lucid and vivid even to the readers who are relatively new to this area. Besides, various examples have been provided to display the applicability of presented models and methodologies to assist the readers in applying the concepts presented in this book.

Reliability Modelling and Analysis in Discrete Time

"Reliability theory and applications become major concerns of engineers and managers engaged in making high quality products and designing highly reliable systems. This book aims to survey new research topics in reliability theory and useful applied techniques in reliability engineering." "The reader will learn new topics and techniques, and how to apply reliability models to actual ones. The book will serve as an essential guide to a subject of study for graduate students and researchers and as a useful

guide for reliability engineers engaged not only in maintenance work but also in management and computer works." --Book Jacket.

Systems Engineering

The 2006 Asian International Workshop on Advanced Reliability Modeling (AIWARM) is the second symposium in a series of biennial workshops for the dissemination of state-of-art research and the presentation of practice in reliability and maintenance engineering in Asia. It brings together researchers and engineers from not only Asian countries but also all over world to discuss the state of research and practice in dealing with both reliability issues at the system design phase and maintenance issues at the system operation phase. The theme of AIWARM 2006 is ?reliability testing and improvement?. The contributions in this volume cover all the main topics in reliability and maintenance engineering, providing an in-depth presentation of theory and practice.

Software Reliability Modeling

The book presents highly technical approaches to the probabilistic physics of failure analysis and applications to accelerated life and degradation testing to reliability prediction and assessment. Beside reviewing a select set of important failure mechanisms, the book covers basic and advanced methods of performing accelerated life test and accelerated degradation tests and analyzing the test data. The book includes a large number of very useful

examples to help readers understand complicated methods described. Finally, MATLAB, R and OpenBUGS computer scripts are provided and discussed to support complex computational probabilistic analyses introduced.