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Robert Siegfried presents a framework for efficient agent-based modeling and simulation of complex systems. He compares different approaches for describing structure and dynamics of agent-based models in detail. Based on this evaluation the author introduces the "General Reference Model for Agent-based Modeling and Simulation" (GRAMS). Furthermore he presents parallel and distributed simulation approaches for execution of agent-based models –from small scale to very large scale. The author shows how agent-based models may be executed by different simulation engines that utilize underlying hardware resources in an optimized fashion. Offers Both Standard and Novel Approaches for the Modeling of Systems Examines the Interesting Behavior of Particular Classes of Models Chaotic Modelling and Simulation: Analysis of Chaotic Models, Attractors and Forms presents the main models developed by pioneers of chaos theory, along with new extensions and variations of these models. Using more than 500 graphs and illustrations, the authors show how to design, estimate, and test an array of models. Requiring little prior knowledge of mathematics, the book focuses on classical forms and attractors as well as new simulation methods and techniques. Ideas clearly progress from the most elementary to the most advanced. The authors cover deterministic, stochastic, logistic, Gaussian, delay, Hénon, Holmes, Lorenz, Rössler, and rotation models. They also look at chaotic analysis as a tool to design forms that appear in physical systems; simulate complicated and chaotic orbits and paths in the solar system; explore the Hénon–Heiles, Contopoulos, and Hamiltonian systems; and provide a compilation of interesting systems and variations of systems, including the very intriguing Lotka–Volterra system. Making a complex topic accessible through a visual and geometric style, this book should inspire new developments in the field of chaotic models and encourage more readers to become involved in this rapidly advancing area. Model building in the social sciences can increasingly rely on well elaborated formal theories. At the same time inexpensive large computational capacities are now available. Both make computer-based model building and simulation possible in social science, whose central aim is in particular an understanding of social dynamics. Such social dynamics refer to public opinion formation, partner choice, strategy decisions in social dilemma situations and much more. In the context of such modelling approaches, novel problems in philosophy of science arise which must be analysed - the main aim of this book. Interest in social simulation has recently been growing rapidly world- wide, mainly as a result of the increasing availability of powerful personal computers. The field has also been greatly influenced by developments in cellular automata theory (from mathematics) and in distributed artificial intelligence which provided tools readily applicable to social simulation. This book presents a number of modelling and simulation approaches and their relations to problems in philosophy of science. It addresses sociologists and other social scientists interested in formal modelling, mathematical sociology, and computer simulation as well as computer scientists interested in social science applications, and philosophers of social science. *Theory of Modeling and Simulation: Discrete Event & Iterative System Computational Foundations, Third Edition*, continues the legacy of this authoritative and complete theoretical work. It is ideal for graduate and PhD students and working engineers interested in posing and solving problems using the tools of logico-mathematical modeling and computer simulation. Continuing its emphasis on the integration of discrete event and continuous modeling approaches, the work focuses light on DEVS and its potential to support the co-existence and interoperation of multiple formalisms in model components. New sections in this updated edition include discussions on important new extensions to theory, including chapter-length coverage of iterative system specification and DEVS and their fundamental importance, closure under coupling for iteratively specified systems, existence, uniqueness, non-deterministic conditions, and temporal progressiveness (legitimacy). Presents a 40% revised and expanded new edition of this classic book with many important post-2000 extensions to core theory Provides a streamlined introduction to Discrete Event System Specification (DEVS) formalism for modeling and simulation Packages all the "need-to-know" information on DEVS formalism in one place Expanded to include an online ancillary package, including numerous examples of theory and implementation in DEVS-based software, student solutions and instructors manual The book presents select proceedings of Global meet on 'Computational Modelling and Simulation, Recent Innovations, Challenges and Perspectives, 2020. This book covers leading-edge technologies from different domains such as computation in optimization and control, multiscale and multiphysics modeling and computation analysis, environmental modeling, modeling approaches to enterprise systems and services, finite element analysis, dependability and security, high-performance computation/cloud computing applications, computational biology and chemistry and computational mechanics. The primary goal of this book is to strengthen pre-eminence in computational modeling and simulation by catalyzing the transformative use of innovative developments in a wide range of disciplines to achieve lasting societal impact. The book discusses on how to perform simulation of large complex dynamic systems in an efficient manner using advanced computational analysis. The inter-disciplinary nature of the book would be a valuable reference for academicians and research scientists, industrialists interested in modelling and simulation driven by computational technology. The Asia Simulation Conference 2006 (JSST 2006) was aimed at exploring challenges in methodologies for modeling, control and computation in simulation, and their applications in social, economic, and financial fields as well as established scientific and engineering solutions. The conference was held in Tokyo from October 30 to November 1, 2006, and included keynote speeches presented by technology and industry leaders, technical sessions, organized sessions, poster sessions, and vendor exhibits. It was the seventh annual international conference on system simulation and scientific computing, which is organized by the Japan Society for Simulation Technology (JSST), the Chinese Association for System Simulation (CASS), and the Korea Society for Simulation (KSS). For the conference, all submitted papers were refereed by the international technical program committee, each paper receiving at least two independent reviews. After careful reviews by the committee, 65 papers from 143 submissions were selected for oral presentation. This volume includes the keynote speakers' papers along with the papers presented at

the oral sessions and the organized sessions. As a result, we are publishing 87 papers for the conference in this volume. In addition to the scientific tracts presented, the conference featured keynote presentations by five invited speakers. We are grateful to them for accepting our invitation and for their presentations. We also would like to express our gratitude to all contributors, reviewers, technical program committee members, and organizing committee members who made the conference very successful.

Learn How to Program Stochastic Models Highly recommended, the best-selling first edition of *Introduction to Scientific Programming and Simulation Using R* was lauded as an excellent, easy-to-read introduction with extensive examples and exercises. This second edition continues to introduce scientific programming and stochastic modelling in a clear, practical, and thorough way. Readers learn programming by experimenting with the provided R code and data. The book's four parts teach: Core knowledge of R and programming concepts How to think about mathematics from a numerical point of view, including the application of these concepts to root finding, numerical integration, and optimisation Essentials of probability, random variables, and expectation required to understand simulation Stochastic modelling and simulation, including random number generation and Monte Carlo integration In a new chapter on systems of ordinary differential equations (ODEs), the authors cover the Euler, midpoint, and fourth-order Runge-Kutta (RK4) schemes for solving systems of first-order ODEs. They compare the numerical efficiency of the different schemes experimentally and show how to improve the RK4 scheme by using an adaptive step size. Another new chapter focuses on both discrete- and continuous-time Markov chains. It describes transition and rate matrices, classification of states, limiting behaviour, Kolmogorov forward and backward equations, finite absorbing chains, and expected hitting times. It also presents methods for simulating discrete- and continuous-time chains as well as techniques for defining the state space, including lumping states and supplementary variables. Building readers' statistical intuition, *Introduction to Scientific Programming and Simulation Using R, Second Edition* shows how to turn algorithms into code. It is designed for those who want to make tools, not just use them. The code and data are available for download from CRAN. This work began when I was appointed as a Technical Director for Modeling and Simulation (M&S) Verification and Validation (V&V) for a major defense system in 2008. It is intended to provide the nuts and bolts of performing M&S V&V in one volume. It is not intended to provide a holistic approach to M&S V&V, as that can be derived from other sources. As such, this book assumes a basic understanding of V&V, including its place in the lifecycle, its purpose and its scope for ensuring the quality of models and simulations. During the process of developing this text, the Simulation Interoperability Standards Organization (SISO) completed SISO-GUIDE-001.2-2013, *Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data*, 2 Volumes, June 2013. The guide does serve the purpose not covered by this book. This text provides procedural details for performing V&V. The procedures are static, dynamic and informal. This guide demonstrates how virtual build and test can be supported by the Discrete Event Systems Specification (DEVS) simulation modeling formalism, and the System Entity Structure (SES) simulation model ontology. The book examines a wide variety of Systems of Systems (SoS) problems, ranging from cloud computing systems to biological systems in agricultural food crops. Features: includes numerous exercises, examples and case studies throughout the text; presents a step-by-step introduction to DEVS concepts, encouraging hands-on practice to building sophisticated SoS models; illustrates virtual build and test for a variety of SoS applications using both commercial and open source DEVS simulation environments; introduces an approach based on activity concepts intrinsic to DEVS-based system design, that integrates both energy and information processing requirements; describes co-design modeling concepts and methods to capture separate and integrated software and hardware systems. Commissioned by the Society for Modeling and Simulation International (SCS), this needed, useful new 'Body of Knowledge' (BoK) collects and organizes the common understanding of a wide collection of professionals and professional associations. Modeling and simulation (M&S) is a ubiquitous discipline that lays the computational foundation for real and virtual experimentation, clearly stating boundaries—and interactions—of systems, data, and representations. The field is well known, too, for its training support via simulations and simulators. Indeed, with computers increasingly influencing the activities of today's world, M&S is the third pillar of scientific understanding, taking its place along with theory building and empirical observation. This valuable new handbook provides intellectual support for all disciplines in analysis, design and optimization. It contributes increasingly to the growing number of computational disciplines, addressing the broad variety of contributing as well as supported disciplines and application domains. Further, each of its sections provide numerous references for further information. Highly comprehensive, the BoK represents many viewpoints and facets, captured under such topics as: Mathematical and Systems Theory Foundations Simulation Formalisms and Paradigms Synergies with Systems Engineering and Artificial Intelligence Multidisciplinary Challenges Ethics and Philosophy Historical Perspectives Examining theoretical as well as practical challenges, this unique volume addresses the many facets of M&S for scholars, students, and practitioners. As such, it affords readers from all science, engineering, and arts disciplines a comprehensive and concise representation of concepts, terms, and activities needed to explain the M&S discipline. Tuncer Ören is Professor Emeritus at the University of Ottawa. Bernard Zeigler is Professor Emeritus at the University of Arizona. Andreas Tolk is Chief Scientist at The MITRE Corporation. All three editors are long-time members and Fellows of the Society for Modeling and Simulation International. Under the leadership of three SCS Fellows, Dr. Ören, University of Ottawa, Dr. Zeigler, The University of Arizona, and Dr. Tolk, The MITRE Corporation, more than 50 international scholars from 15 countries provided insights and experience to compile this initial M&S Body of Knowledge. Die Autoren führen auf anschauliche und systematische Weise in die mathematische und informatische Modellierung sowie in die Simulation als universelle Methodik ein. Es geht um Klassen von Modellen und um die Vielfalt an Beschreibungsarten. Aber es geht immer auch darum, wie aus Modellen konkrete Simulationsergebnisse gewonnen werden können. Nach einem kompakten Repetitorium zum benötigten mathematischen Apparat wird das Konzept anhand von Szenarien u. a. aus den Bereichen „Spielen – entscheiden – planen“ und „Physik im Rechner“ umgesetzt. How the simulation and visualization technologies so pervasive in science, engineering, and design have changed our way of seeing the world. Over the past twenty years, the technologies of simulation and visualization have changed our ways of looking at the world. In *Simulation and Its Discontents*, Sherry Turkle examines the now dominant medium of our working lives and finds that simulation has become its own sensibility. We hear it in Turkle's description of architecture students who no longer design with a pencil, of science and engineering students who admit that computer models seem more “real” than experiments in physical laboratories. Echoing architect Louis Kahn's famous question, “What does a brick want?”, Turkle asks, “What does simulation want?” Simulations want, even demand, immersion, and the benefits are clear. Architects create buildings unimaginable before virtual design; scientists determine the structure of molecules by manipulating them in virtual space; physicians practice anatomy on digitized humans. But immersed in simulation, we are vulnerable. There are losses as well as gains. Older scientists describe a younger generation as “drunk with code.” Young scientists, engineers, and designers, full citizens of the virtual, scramble to capture their mentors' tacit knowledge of buildings and bodies. From both sides of a generational divide, there is anxiety that in simulation, something important is slipping away. Turkle's examination of simulation over the past twenty years is followed by four in-depth investigations of contemporary simulation culture: space exploration, oceanography, architecture, and biology. This book is the the English Language Version of the very successful German textbook, "Modellbildung und Simulation". It provides a self-contained and complete guide to the methods and mathematical background of modeling and simulation software of dynamic systems. Furthermore, an appropriate simulation software and a collection of dynamic system models (on the accompanying disk) are highlights of the book/software-Package. Dies ist die englischsprachige Ausgabe des sehr erfolgreichen Lehrbuches "Modellbildung und Simulation". Geboten wird eine vollständige Einführung in die Methoden der Simulation dynamischer Systeme, wobei auch der notwendige mathematische Hintergrund vermittelt wird. Außerdem ist eine Simulationssoftware Bestandteil des Werkes; auf der beiliegenden Diskette befinden sich ferner 50 Beispielsysteme ("Systemzoo"), die zur spielerischen Einübung der verwendeten Verfahren hilfreich sind. Explores wide-ranging applications of modeling and simulation techniques that allow readers to conduct research and ask "Whatif??" *Principles of Modeling and Simulation: A Multidisciplinary Approach* is the first book to provide an introduction to modeling and simulation techniques across diverse areas of study. Numerous researchers from the fields of social science, engineering, computer science, and business have collaborated on this work to explore the multifaceted uses of computational modeling while illustrating their applications in common spreadsheets. The book is organized into three succinct parts: *Principles of Modeling and Simulation* provides a brief history of modeling and simulation, outlines its many functions, and explores the advantages and disadvantages of using models in problem solving. Two major reasons to employ modeling and simulation are illustrated through the study of a specific problem in conjunction with the use of related applications, thus gaining insight into complex concepts. *Theoretical Underpinnings* examines various modeling techniques and introduces readers to two significant simulation concepts: discrete event simulation and simulation of continuous systems. This section details the two primary methods in which humans interface with simulations, and it also distinguishes the meaning, importance, and significance of verification and validation. *Practical Domains* delves into specific topics related to transportation, business, medicine, social science, and enterprise decision support. The challenges of modeling and simulation are discussed, along with advanced applied principles of modeling and simulation such as representation techniques, integration into the application infrastructure, and emerging technologies. With its accessible style and wealth of real-world examples, *Principles of Modeling and Simulation: A Multidisciplinary Approach* is a valuable book for modeling and simulation courses at the upper-undergraduate and graduate levels. It is also an indispensable reference for researchers and practitioners working in statistics, mathematics, engineering, computer science, economics, and the social sciences who would like to further develop their understanding and knowledge of the field. *Fundamentals of Turbulent and Multiphase Combustion* Detailed coverage of advanced combustion topics from the author of *Principles of Combustion, Second Edition* Turbulence, turbulent combustion, and multiphase reacting flows have become major research topics in recent decades due to their application across diverse fields, including energy, environment, propulsion, transportation, industrial safety, and nanotechnology. Most of the knowledge accumulated from this research has never been published in book form—until now. *Fundamentals of Turbulent and Multiphase Combustion* presents up-to-date, integrated coverage of the fundamentals of turbulence, combustion, and multiphase phenomena along with useful experimental techniques, including non-intrusive, laser-based measurement techniques, providing a firm background in both contemporary and classical approaches. Beginning with two full chapters on laminar premixed and non-premixed flames, this book takes a multiphase approach, beginning with more common topics and moving on to higher-level applications. In addition, *Fundamentals of Turbulent and Multiphase Combustion: Addresses seven basic topical areas in combustion and multiphase flows, including laminar premixed and non-premixed flames, theory of turbulence, turbulent premixed and non-premixed flames, and multiphase flows* Covers spray atomization and combustion, solid-propellant combustion, homogeneous propellants, nitramines, reacting boundary-layer flows, single energetic particle combustion, and granular bed combustion Provides experimental setups and results whenever appropriate Supported with a large number of examples and problems as well as a solutions manual, *Fundamentals of Turbulent and Multiphase Combustion* is an important resource for professional engineers and researchers as well as graduate students in mechanical, chemical, and aerospace engineering. *Modeling and Simulation in Python* teaches readers how to analyze real-world scenarios using the Python programming language, requiring no more than a background in high school math. *Modeling and Simulation in Python* is a thorough but easy-to-follow introduction to physical modeling—that is, the art of describing and simulating real-world systems. Readers are guided through modeling things like world population growth, infectious disease, bungee jumping, baseball flight trajectories, celestial mechanics, and more while simultaneously developing a strong understanding of fundamental programming concepts like loops, vectors, and functions. Clear and concise, with a focus on learning by doing, the author spares the reader abstract, theoretical complexities and gets right to hands-on examples that show how to produce useful models and simulations. This book fills a gap by presenting our current knowledge and understanding of continuum-based concepts behind computational methods used for microstructure and process simulation of engineering materials above the atomic scale. The volume provides an excellent overview on the different methods, comparing the different methods in terms of their respective particular weaknesses and advantages. This trains readers to identify appropriate approaches to the new challenges that emerge every day in this exciting domain. Divided into three main parts, the first is a basic overview covering fundamental key methods in the field of continuum scale materials simulation. The second one then goes on to look at applications of these methods to the prediction of microstructures, dealing with explicit simulation examples, while the third part

discusses example applications in the field of process simulation. By presenting a spectrum of different computational approaches to materials, the book aims to initiate the development of corresponding virtual laboratories in the industry in which these methods are exploited. As such, it addresses graduates and undergraduates, lecturers, materials scientists and engineers, physicists, biologists, chemists, mathematicians, and mechanical engineers. Although computational modeling and simulation of material deformation was initiated with the study of structurally simple materials and inert environments, there is an increasing demand for predictive simulation of more realistic material structure and physical conditions. In particular, it is recognized that applied mechanical force can plausibly alter chemical reactions inside materials or at material interfaces, though the fundamental reasons for this chemomechanical coupling are studied in a material-specific manner. Atomistic-level simulations can provide insight into the unit processes that facilitate kinetic reactions within complex materials, but the typical nanosecond timescales of such simulations are in contrast to the second-scale to hour-scale timescales of experimentally accessible or technologically relevant timescales. Further, in complex materials these key unit processes are "rare events" due to the high energy barriers associated with those processes. Examples of such rare events include unbinding between two proteins that tether biological cells to extracellular materials [1], unfolding of complex polymers, stiffness and bond breaking in amorphous glasses and gels [2], and diffusive hops of point defects within crystalline alloys [3].

Develops a theory of contemporary culture that relies on displacing economic notions of cultural production with notions of cultural expenditure. This book represents an effort to rethink cultural theory from the perspective of a concept of cultural materialism, one that radically redefines postmodern formulations of the body. Collecting the work of the foremost scientists in the field, *Discrete-Event Modeling and Simulation: Theory and Applications* presents the state of the art in modeling discrete-event systems using the discrete-event system specification (DEVS) approach. It introduces the latest advances, recent extensions of formal techniques, and real-world examples of various applications. The book covers many topics that pertain to several layers of the modeling and simulation architecture. It discusses DEVS model development support and the interaction of DEVS with other methodologies. It describes different forms of simulation supported by DEVS, the use of real-time DEVS simulation, the relationship between DEVS and graph transformation, the influence of DEVS variants on simulation performance, and interoperability and composability with emphasis on DEVS standardization. The text also examines extensions to DEVS, new formalisms, and abstractions of DEVS models as well as the theory and analysis behind real-world system identification and control. To support the generation and search of optimal models of a system, a framework is developed based on the system entity structure and its transformation to DEVS simulation models. In addition, the book explores numerous interesting examples that illustrate the use of DEVS to build successful applications, including optical network-on-chip, construction/building design, process control, workflow systems, and environmental models. A one-stop resource on advances in DEVS theory, applications, and methodology, this volume offers a sampling of the best research in the area, a broad picture of the DEVS landscape, and trend-setting applications enabled by the DEVS approach. It provides the basis for future research discoveries and encourages the development of new applications. This yearbook brings together topical and authoritative contributions from leading international figures in the field of games and simulations, representing current international thinking and best practice. Computer simulation was first pioneered as a scientific tool in meteorology and nuclear physics in the period following World War II, but it has grown rapidly to become indispensable in a wide variety of scientific disciplines, including astrophysics, high-energy physics, climate science, engineering, ecology, and economics. Digital computer simulation helps study phenomena of great complexity, but how much do we know about the limits and possibilities of this new scientific practice? How do simulations compare to traditional experiments? And are they reliable? Eric Winsberg seeks to answer these questions in *Science in the Age of Computer Simulation*. Scrutinizing these issues with a philosophical lens, Winsberg explores the impact of simulation on such issues as the nature of scientific evidence; the role of values in science; the nature and role of fictions in science; and the relationship between simulation and experiment, theories and data, and theories at different levels of description. *Science in the Age of Computer Simulation* will transform many of the core issues in philosophy of science, as well as our basic understanding of the role of the digital computer in the sciences. "This is an excellent and well-written text on discrete event simulation with a focus on applications in Operations Research. There is substantial attention to programming, output analysis, pseudo-random number generation and modelling and these sections are quite thorough. Methods are provided for generating pseudo-random numbers (including combining such streams) and for generating random numbers from most standard statistical distributions." --ISI Short Book Reviews, 22:2, August 2002

Modeling and Simulation of Aerospace Vehicle Dynamics, Third Edition unifies all aspects of flight dynamics for the efficient development of aerospace vehicle simulations. It provides the reader with a complete set of tools to build, program, and execute simulations. Unlike other books, it uses tensors for modeling flight dynamics in a form invariant under coordinate transformations. For implementation, the tensors are converted into matrices, resulting in compact computer code. In this third edition, the emphasis shifts from FORTRAN to C++, in recognition of the upsurge of object oriented programming in engineering simulations. A new appendix spotlights the C++ architecture of the CADAC++ simulation framework. To aid this new focus, the CADAC4 software package provides—in addition to the FORTRAN programs—eight C++ simulations, which range from UAVs, aircraft, missiles, and boosters to hypersonic aircraft with transfer vehicles for satellite rendezvous. CADAC4, including CADAC Studio for plotting, may be downloaded for free by entering the Supporting Materials password supplied in the book. You need only a Windows-based PC (32 or 64 bit) and a Microsoft C++ compiler. Amply illustrated, this text can be used for advanced undergraduate and graduate instruction or for self-study. Seventy eight problems and nine projects amplify the topics and develop the material further. Qualified instructors may obtain a complimentary solutions manual from AIAA. This book was sponsored by the U.S. Air Force Academy Space Mission Analysis and Design Program with support from program offices at the Air Force Space and Missile Systems Center, the National Reconnaissance Office, the U.S. Department of Transportation, and organizations within the National Aeronautics and Space Administration. A coherent introduction to the techniques for modeling dynamic stochastic systems, this volume also offers a guide to the mathematical, numerical, and simulation tools of systems analysis. Each chapter opens with an illustrative case study, and comprehensive presentations include formulation of models, determination of parameters, analysis, and interpretation of results. 1995 edition. Simulation is the art of using tools – physical or conceptual models, or computer hardware and software, to attempt to create the illusion of reality. The discipline has in recent years expanded to include the modelling of systems that rely on human factors and therefore possess a large proportion of uncertainty, such as social, economic or commercial systems. These new applications make the discipline of modelling and simulation a field of dynamic growth and new research. Stanislaw Raczynski outlines the considerable and promising research that is being conducted to counter the problems of uncertainty surrounding the methods used to approach these new applications. It aims to stimulate the reader into seeking out new tools for modelling and simulation. Examines the state-of-the-art in recent research into methods of approaching new applications in the field of modelling and simulation Provides an introduction to new modelling tools such as differential inclusions, metric structures in the space of models, semi-discrete events, and use of simulation in parallel optimization techniques Discusses recently developed practical applications: for example the PAsION simulation system, stock market simulation, a new fluid dynamics tool, manufacturing simulation and the simulation of social structures Illustrated throughout with a series of case studies *Modelling and Simulation: The Computer Science of Illusion* will appeal to academics, postgraduate students, researchers and practitioners in the modelling and simulation of industrial computer systems. It will also be of interest to those using simulation as an auxiliary tool. This text and accompanying computer software package is designed for a course in feedback control systems. It emphasises a firm grasp of the basic principles of control theory, going on to provide examples of how to apply the principles to produce working designs. The book uses examples and exercises to illustrate the principles involved. Divided into three main parts, the book guides the reader to an understanding of the basic concepts in this fascinating field of research. Part 1 introduces you to the fundamental concepts of simulation. It examines one-dimensional electrostatic codes and electromagnetic codes, and describes the numerical methods and analysis. Part 2 explores the mathematics and physics behind the algorithms used in Part 1. In Part 3, the authors address some of the more complicated simulations in two and three dimensions. The book introduces projects to encourage practical work Readers can download plasma modeling and simulation software — the ES1 program — with implementations for PCs and Unix systems along with the original FORTRAN source code. p-BodyText2Now available in paperback, *Plasma Physics via Computer Simulation* is an ideal complement to plasma physics courses and for self-study. Presents applied theory and advanced simulation techniques for electric machines and drives This book combines the knowledge of experts from both academia and the software industry to present theories of multiphysics simulation by design for electrical machines, power electronics, and drives. The comprehensive design approach described within supports new applications required by technologies sustaining high drive efficiency. The highlighted framework considers the electric machine at the heart of the entire electric drive. The book also emphasizes the simulation by design concept—a concept that frames the entire highlighted design methodology, which is described and illustrated by various advanced simulation technologies. *Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives* begins with the basics of electrical machine design and manufacturing tolerances. It also discusses fundamental aspects of the state of the art design process and includes examples from industrial practice. It explains FEM-based analysis techniques for electrical machine design—providing details on how it can be employed in ANSYS Maxwell software. In addition, the book covers advanced magnetic material modeling capabilities employed in numerical computation; thermal analysis; automated optimization for electric machines; and power electronics and drive systems. This valuable resource: Delivers the multi-physics know-how based on practical electric machine design methodologies Provides an extensive overview of electric machine design optimization and its integration with power electronics and drives Incorporates case studies from industrial practice and research and development projects *Multiphysics Simulation by Design for Electrical Machines, Power Electronics and Drives* is an incredibly helpful book for design engineers, application and system engineers, and technical professionals. It will also benefit graduate engineering students with a strong interest in electric machines and drives. This user's reference is a companion to the separate book also titled "Guide to Modelling and Simulation of Systems of Systems." The principal book explicates integrated development environments to support virtual building and testing of systems of systems, covering in some depth the MS4 Modelling Environment™. This user's reference provides a quick reference and exposition of the various concepts and functional features covered in that book. The topics in the user's reference are grouped in alignment with the workflow displayed on the MS4 Modeling Environment™ launch page, under the headings Atomic Models, System Entity Structure, Pruning SES, and Miscellaneous. For each feature, the reference discusses why we use it, when we should use it, and how to use it. Further comments and links to related features are also included. The increased computational power and software tools available to engineers have increased the use and dependence on modeling and computer simulation throughout the design process. These tools have given engineers the capability of designing highly complex systems and computer architectures that were previously unthinkable. Every complex design project, from integrated circuits, to aerospace vehicles, to industrial manufacturing processes requires these new methods. This book fulfills the essential need of system and control engineers at all levels in understanding modeling and simulation. This book, written as a true text/reference has become a standard sr./graduate level course in all EE departments worldwide and all professionals in this area are required to update their skills. The book provides a rigorous mathematical foundation for modeling and computer simulation. It provides a comprehensive framework for modeling and simulation integrating the various simulation approaches. It covers model formulation, simulation model execution, and the model building process with its key activities model abstraction and model simplification, as well as the organization of model libraries. Emphasis of the book is in particular in integrating discrete event and continuous modeling approaches as well as a new approach for discrete event simulation of continuous processes. The book also discusses simulation execution on parallel and distributed machines and concepts for simulation model realization based on the High Level Architecture (HLA) standard of the Department of Defense. Presents a working foundation necessary for compliance with High Level Architecture (HLA) standards Provides a comprehensive framework for continuous and discrete event modeling and simulation Explores the mathematical foundation of simulation modeling Discusses system morphisms for model abstraction and simplification Presents a new approach to discrete event simulation of continuous processes Includes parallel and distributed simulation of discrete event models Presents a concept to achieve simulator interoperability in the form of the DEVS-Bus This book provides a

balanced and integrated presentation of modelling and simulation activity for both Discrete Event Dynamic Systems (DEDS) and Continuous Time Dynamic Systems (CYDS). The authors establish a clear distinction between the activity of modelling and that of simulation, maintaining this distinction throughout. The text offers a novel project-oriented approach for developing the modelling and simulation methodology, providing a solid basis for demonstrating the dependency of model structure and granularity on project goals. Comprehensive presentation of the verification and validation activities within the modelling and simulation context is also shown. Model Engineering for Simulation provides a systematic introduction to the implementation of generic, normalized and quantifiable modeling and simulation using DEVS formalism. It describes key technologies relating to model lifecycle management, including model description languages, complexity analysis, model management, service-oriented model composition, quantitative measurement of model credibility, and model validation and verification. The book clearly demonstrates how to construct computationally efficient, object-oriented simulations of DEVS models on parallel and distributed environments. Guides systems and control engineers in the practical creation and delivery of simulation models using DEVS formalism Provides practical methods to improve credibility of models and manage the model lifecycle Helps readers gain an overall understanding of model lifecycle management and analysis Supported by an online ancillary package that includes an instructors and student solutions manual The complete guide to the principles and practice of risk quantification for business applications. The assessment and quantification of risk provide an indispensable part of robust decision-making; to be effective, many professionals need a firm grasp of both the fundamental concepts and of the tools of the trade. Business Risk and Simulation Modelling in Practice is a comprehensive, in-depth, and practical guide that aims to help business risk managers, modelling analysts and general management to understand, conduct and use quantitative risk assessment and uncertainty modelling in their own situations. Key content areas include: Detailed descriptions of risk assessment processes, their objectives and uses, possible approaches to risk quantification, and their associated decision-benefits and organisational challenges. Principles and techniques in the design of risk models, including the similarities and differences with traditional financial models, and the enhancements that risk modelling can provide. In depth coverage of the principles and concepts in simulation methods, the statistical measurement of risk, the use and selection of probability distributions, the creation of dependency relationships, the alignment of risk modelling activities with general risk assessment processes, and a range of Excel modelling techniques. The implementation of simulation techniques using both Excel/VBA macros and the @RISK Excel add-in. Each platform may be appropriate depending on the context, whereas the core modelling concepts and risk assessment contexts are largely the same in each case. Some additional features and key benefits of using @RISK are also covered. Business Risk and Simulation Modelling in Practice reflects the author's many years in training and consultancy in these areas. It provides clear and complete guidance, enhanced with an expert perspective. It uses approximately one hundred practical and real-life models to demonstrate all key concepts and techniques; these are accessible on the companion website. This book is an introduction to the High Level Architecture for modeling and simulation. The HLA is a software architecture for creating computer models and simulation out of component models or simulations. HLA was adopted by the US Defense Dept. The book is an introduction to HLA for application developers. Advances in computational power have facilitated the development of simulations unprecedented in their computational size, scope of technical issues, spatial and temporal resolution, complexity and comprehensiveness. As a result, complex structures from airplanes to bridges can be almost completely based on model-based simulations. This book gives a state-of-the-art account of modeling and simulation of the life cycle of engineered systems, covering topics of design, fabrication, maintenance and disposal. Providing comprehensive coverage of this rapidly emerging field, Modeling and Simulation-Based Life Cycle Engineering is essential reading for civil, mechanical and manufacturing engineers. It will also appeal to students and academics in this area.

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