Matlab For Semiconductor Simulation

Electrotechnical Systems
Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset
The Monte Carlo Method for Semiconductor Device Simulation
Photonics Modelling and Design
Semiconductor Device Physics and Simulation
Modeling Bipolar Power Semiconductor Devices
Power Integrity Modeling and Design for Semiconductors and Systems
System Simulation Techniques with MATLAB and Simulink
Simulation of Some Power System and Power Electronics Case Studies Using Matlab and PowerWorld Simulator Programs
Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset
Electronics and Circuit Analysis Using MATLAB
Compact MOSFET Models for VLSI Design
Simulation of Semiconductor Processes and Devices 2007
Compound Semiconductor Device Modelling
Solving Electronic Circuits in MATLAB and SIMULINK

Simulation of Dynamic Systems with MATLAB and Simulink
Simulation of Semiconductor Devices and Processes
Circuit Analysis I
Some Power Electronics Case Studies Using Matlab Simpowersystem Blockset
Modeling And Electrothermal Simulation Of Sic Power Devices: Using Silvaco© Atlas
Transient Electro-Thermal Modeling of Bipolar Power Semiconductor Devices
Electronic Devices and Amplifier Circuits with MATLAB Computing, Second Edition
BSIM4 and MOSFET Modeling for IC Simulation
Simulation of Some Power Electronics Case Studies Using Matlab Simpowersystem Blockset
PSPICE and MATLAB for Electronics
Simulation of Some Power System, Control System and Power Electronics Case Studies Using Matlab and PowerWorld Simulator Programs
Computational Electronic Circuits
Simulation of Some Power System, Control System and Power Electronics Case Studies Using Matlab and PowerWorld Simulator Programs
Transient Electro-Thermal Modeling on Power Semiconductor Devices
Power Electronics with MATLAB
Modeling Bipolar Power Semiconductor Devices
Computational Photonics
Atomic Scale Images of Acceptors in III-V Semiconductors
Introduction to Simulations of Semiconductor

Lasers
Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset
Simulation of Power Electronics Circuits with MATLAB®/Simulink®
Computational Modeling in Semiconductor Processing
Semiconductor Modeling:
Introduction to RF Power Amplifier Design and Simulation
Electronic Devices and Amplifier Circuits with MATLAB®

WARREN JORDYN

Electrotechnical Systems CRC Press Design and analyze electronic components and systems with the help of powerful software and effective skillsets. Balancing theory with practical exploration of the relevant software, you'll start solving power electronics problems like a pro. Using MATLAB®/Simulink®, you'll analyze the circuit in a laptop charger; interface with the power electronics converter controlling a washing machine's motor; turn on lamps with an electronic ballast; convert AC into DC power; and more! Power electronics are at the bedrock of all the wonderful devices simplifying our daily life. Designing them isn't just about understanding schematics. It also requires measuring twice and cutting once. In order to save time and money, a power electronics circuit must be simulated before construction. So you'll learn how to work with one of the most powerful simulation tools for this purpose. That way you'll know before you even go to make it whether the circuit works as expected. Learn to work with MATLAB®/Simulink® by directly applying and building the projects in this book. Or use it as a lab manual for power electronics and industrial electronics. Either way, using strong simulations and solid design theory, you'll be able to build power electronics that don't fail. You will: Simulate power electronics effectively before building them Select suitable semiconductor components for your circuit based on simulation waveforms Extract dynamic models of converters and design suitable controllers for them.

Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset Createspace Independent Publishing Platform

"Simulations play an increasingly important role not only in scientific research but also in engineering developments. Introduction to Simulations of Semiconductor Lasers introduces senior undergraduates to the design of semiconductor lasers and their simulations. The book begins with explaining the physics and fundamental characteristics behind semiconductor lasers and their applications. It presumes little prior knowledge, such that only a familiarity with the basics of electromagnetism and quantum mechanics is required. The book transitions from textbook explanations, equations, and formulas to ready-to-run numeric codes that enable the visualization of concepts and simulation studies. Multiple chapters are supported by Matlab code which can be accessed by the students. These are ready-to-run, but they can be modified to simulate other structures if desired. Providing a unified treatment of the fundamental principles and physics of semiconductors and semiconductor lasers, Introduction to Simulations of Semiconductor Lasers is an accessible, practical guide for advanced undergraduate students of Physics, particularly for courses in laser physics. Marek S. Wartak is a Professor in the Department of Physics and Computer Science at Wilfrid Laurier University, Waterloo, Ontario. He has over 30 years of experience in semiconductor physics, photonics and optoelectronics, analytical methods, modelling and computer-aided design tools"--

The Monte Carlo

Method for Semiconductor Device Simulation CRC Press
Used collectively, PSPICE and MATLAB are unsurpassed for circuit modeling and data analysis. PSPICE can perform DC, AC, transient, Fourier, temperature, and Monte Carlo analysis of electronic circuits with device models and subsystem subcircuits. MATLAB can then carry out calculations of device parameters, curve fitting, numerical integration, nume

Photonics Modelling and Design Springer Nature
"Discusses the essential concepts of power electronics through MATLAB examples and simulations"--

Semiconductor Device Physics and Simulation Springer Science & Business Media
This book provides you with in-depth coverage of the models, governing equations, and numerical techniques suitable for process simulation -- so you can give your designs the competitive edge. You will understand the basic principles of transport phenomena, gas phase, and surface reactions in electronics material processing, and learn practical numerical techniques used in process simulations.

Modeling Bipolar Power Semiconductor Devices Springer Nature
The advent of the microelectronics technology has made ever-increasing numbers of small devices on a same

chip. The rapid emergence of ultra-large-scaled-integrated (ULSI) technology has moved device dimension into the sub-quarter-micron regime and put more than 10 million transistors on a single chip. While traditional closed-form analytical models furnish useful intuition into how semiconductor devices behave, they no longer provide consistently accurate results for all modes of operation of these very small devices. The reason is that, in such devices, various physical mechanisms affect the device performance in a complex manner, and the conventional assumptions (i. e. , one-dimensional treatment, low-level injection, quasi-static approximation, etc.) em ployed in developing analytical models become questionable. Thus, the use of numerical device simulation becomes important in device modeling. Researchers and engineers will rely even more on device simulation for device design and analysis in the future. This book provides comprehensive coverage of device simulation and analysis for various modem semiconductor devices. It will serve as a reference for researchers, engineers, and students who require in-depth, up-to-date information and understanding of semiconductor device physics and characteristics. The materials of the book are limited to conventional and mainstream semiconductor devices; photonic devices such as light emitting and laser diodes are not included, nor does the book cover device modeling, device fabrication, and circuit applications.

Power Integrity Modeling and Design for Semiconductors and Systems Springer Science & Business Media

The book consists from three parts concerning simulation of some power system, control system and power electronics case studies using matlab and powerworld simulator programs - Part A: Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset: -Part B: Control of DC Motor Using Different Control Strategies in Matlab: - Part C: Investigation of the Usefulness of the PowerWorld Simulator Program Developed by "Glover, Overbye and Sarma" in the Solution of Power System Problems: I. Part A: Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset: This part covers some case studies that provide detailed, realistic examples of how to use SimPowerSystems in modeling power system dynamics in various types of application that use power electronics converters. The following case studies are simulated on the paper: 1- Thyristor-Based Static Var Compensator. 2.

Transient Stability of a Power System with SVC and PSS. 3. GTO-Based STATCOM. 4. Control of load flow using UPFC. 5- Control of AC motor. 6- Control of DC motor. 7- VSC-Based HVDC Link. II. Part B: Control of DC Motor Using Different Control Strategies in Matlab: A simple model of a DC motor driving an inertial load has the angular speed of the load,, as the output and applied voltage,, as the input. The system was used as an example in [1]. The ultimate goal of this paper is to control the angular rate by varying the applied voltage using different control strategies for comparison purpose. The comparision is made between the proptional controller, integral controller, propotional and integral controller, phase lag compensator, derivitive controller, lead integral compensator, lead lag compensator, PID controller and the the linear quadratic tracker design based on the optimal control theory. III. Part C: Investigation of the Usefulness of the PowerWorld Simulator Program Developed by "Glover, Overbye, Sarma" in the Solution of Power System Problems:

System Simulation Techniques with MATLAB and Simulink

Universitätsverlag Göttingen

This book presents the art of advanced MOSFET modeling for integrated circuit simulation and design. It provides the essential mathematical and physical analyses of all the electrical, mechanical and thermal effects in MOS transistors relevant to the operation of integrated circuits. Particular emphasis is placed on how the BSIM model evolved into the first ever industry standard SPICE MOSFET model for circuit simulation and CMOS technology development. The discussion covers the theory and methodology of how a MOSFET model, or semiconductor device models in general, can be implemented to be robust and efficient, turning device physics theory into a production-worthy SPICE simulation model. Special attention is paid to MOSFET characterization and model parameter extraction methodologies, making the book particularly useful for those interested or already engaged in work in the areas of semiconductor devices, compact modeling for SPICE simulation, and integrated circuit design.

Simulation of Some Power System and Power Electronics Case Studies Using Matlab and PowerWorld Simulator Programs

Springer Science & Business Media

This volume presents the application of the Monte Carlo method to the simulation of semiconductor devices, reviewing the physics of transport in semiconductors, followed by an introduction to the physics of

semiconductor devices. Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset Pearson Education
SISDEP '95 provides an international forum for the presentation of state-of-the-art research and development results in the area of numerical process and device simulation. Continuously shrinking device dimensions, the use of new materials, and advanced processing steps in the manufacturing of semiconductor devices require new and improved software. The trend towards increasing complexity in structures and process technology demands advanced models describing all basic effects and sophisticated two and three dimensional tools for almost arbitrarily designed geometries. The book contains the latest results obtained by scientists from more than 20 countries on process simulation and modeling, simulation of process equipment, device modeling and simulation of novel devices, power semiconductors, and sensors, on device simulation and parameter extraction for circuit models, practical application of simulation, numerical methods, and software.
Electronics and Circuit Analysis Using MATLAB Orchard Publications
The book consists from three parts concerning simulation of some power system, control system and power electronics case studies using matlab

and powerworld simulator programs - Part A: Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset: - Part B: Control of DC Motor Using Different Control Strategies in Matlab: - Part C: Investigation of the Usefulness of the PowerWorld Simulator Program Developed by "Glover, Overbye & Sarma" in the Solution of Power System Problems: I. Part A: Simulation of Some Power Electronics Case Studies in Matlab Simpowersystem Blockset: This part covers some case studies that provide detailed, realistic examples of how to use SimPowerSystems in modeling power system dynamics in various types of application that use power electronics converters. The following case studies are simulated on the paper: 1- Thyristor-Based Static Var Compensator. 2. Transient Stability of a Power System with SVC and PSS. 3. GTO-Based STATCOM. 4. Control of load flow using UPFC. 5- Control of AC motor. 6- Control of DC motor. 7- VSC-Based HVDC Link. II. Part B: Control of DC Motor Using Different Control Strategies in Matlab: A simple model of a DC motor driving an inertial load has the angular speed of the load, as the output and applied voltage, as the input. The system was used as an example in [1]. The ultimate goal of this paper is to control the angular rate by varying the applied voltage using different control strategies for comparison purpose. The comparision is made between the proptional controller, integral controller, propotional and integral controller, phase lag compensator, derivitive controller, lead integral compensator, lead lag compensator, PID controller and the the linear quadratic tracker design based on the optimal control theory. III. Part C: Investigation of the Usefulness of the PowerWorld Simulator Program Developed by "Glover, Overbye & Sarma" in the Solution of Power System Problems: The objective of this part is to investigate the usefulness of the power system simulator PowerWorld program developed by "Glover, Overbye &Sarma". The results obtained from the power simulator program were presented for different case studies. The power system network used in this study consists from 6 buses. Area 1 includes bus 1-5 while Bus 6 will be part of Area 1 in some case studies, or will form separate area 2 in other case studies for comparison purpose. **Compact MOSFET Models for VLSI Design** Morgan & Claypool Publishers This book presents physics-based electro-thermal models of bipolar power semiconductor devices including their packages, and describes their implementation in

MATLAB and Simulink. It is a continuation of our first book Modeling of Bipolar Power Semiconductor Devices. The device electrical models are developed by subdividing the devices into different regions and the operations in each region, along with the interactions at the interfaces, are analyzed using the basic semiconductor physics equations that govern device behavior. The Fourier series solution is used to solve the ambipolar diffusion equation in the lightly doped drift region of the devices. In addition to the external electrical characteristics, internal physical and electrical information, such as junction voltages and carrier distribution in different regions of the device, can be obtained using the models. The instantaneous dissipated power, calculated using the electrical device models, serves as input to the thermal model (RC network with constant and nonconstant thermal resistance and thermal heat capacity, or Fourier thermal model) of the entire module or package, which computes the junction temperature of the device. Once an updated junction temperature is calculated, the temperature-dependent semiconductor material parameters are re-calculated and used with the device electrical model in the next time-step of the simulation. The physics-based electro-thermal models can be used for optimizing device and package design and also for validating extracted parameters of the devices. The thermal model can be used alone for monitoring the junction temperature of a power semiconductor device, and the resulting simulation results used as an indicator of the health and reliability of the semiconductor power device.

Simulation of Semiconductor Processes and Devices 2007 Dr. Hidaia Mahmood Alassouli This book presents physics-based models of bipolar power semiconductor devices and their implementation in MATLAB and Simulink. The devices are subdivided into different regions, and the operation in each region, along with the interactions at the interfaces which are analyzed using basic semiconductor physics equations that govern their behavior. The Fourier series solution is used to solve the ambipolar diffusion equation in the lightly doped drift region of the devices. In addition to the external electrical characteristics, internal physical and electrical information, such as the junction voltages and the carrier distribution in different regions of the device, can be obtained using the models.

Compound Semiconductor Device Modelling John Wiley & Sons

Discusses process variation, model accuracy, design flow and many other practical engineering, reliability and manufacturing issues Gives a good overview for a person who is not an expert in modeling and simulation, enabling them to extract the necessary information to competently use modeling and simulation programs Written for engineering students and product design engineers

Solving Electronic Circuits in MATLAB and SIMULINK

Springer Science & Business Media

The primary goal of this book is to provide a sound understanding of wide bandgap Silicon Carbide (SiC) power semiconductor device simulation using Silvaco© ATLAS Technology Computer Aided Design (TCAD) software. Physics-based TCAD modeling of SiC power devices can be extremely challenging due to the wide bandgap of the semiconductor material. The material presented in this book aims to shorten the learning curve required to start successful SiC device simulation by providing a detailed explanation of simulation code and the impact of various modeling and simulation parameters on the simulation results. Non-isothermal simulation to predict heat dissipation and lattice temperature rise in a SiC device structure under switching condition has been explained in detail. Key pointers including runtime error messages, code debugging, implications of using certain models and parameter values, and other factors beneficial to device simulation are provided based on the authors' experience while simulating SiC device structures. This book is useful for students, researchers, and semiconductor professionals working in the area of SiC semiconductor technology. Readers will be provided with the source code of several fully functional simulation programs that illustrate the use of Silvaco© ATLAS to simulate SiC power device structure, as well as supplementary material for download. *Simulation of Dynamic Systems with MATLAB and Simulink* CRC Press Compound semiconductor devices form the foundation of solid-state microwave and optoelectronic technologies used in many modern communication systems. In common with their low frequency counterparts, these devices are often represented using equivalent circuit models, but it is often necessary to resort to physical models in order to gain insight into the detailed operation of compound semiconductor devices. Many of the earliest physical models were indeed developed to understand the 'unusual' phenomena which occur at high frequencies. Such was the case with the Gunn and IMPATI diodes, which led to an increased interest in using numerical simulation methods. Contemporary devices often have feature sizes so small that they no longer operate within the familiar traditional framework, and hot electron or even quantum mechanical models are required. The need for accurate and efficient models suitable for computer aided design has increased with the demand for a wider range of integrated devices for operation at microwave, millimetre and optical frequencies. The apparent complexity of equivalent circuit and physics-based models distinguishes high frequency devices from their low frequency counterparts . . Over the past twenty years a wide range of modelling techniques have emerged suitable for describing the operation of compound semiconductor devices. This book brings together for the first time the most popular techniques in everyday use by engineers and scientists. The book specifically addresses the requirements and techniques suitable for modelling GaAs, InP. ternary and quaternary semiconductor devices found in modern technology.

Simulation of Semiconductor Devices and Processes CRC Press

This book presents physics-based electro-thermal models of bipolar power semiconductor devices including their packages, and describes their implementation in MATLAB and Simulink. It is a continuation of our first book Modeling of Bipolar Power Semiconductor Devices. The device electrical models are developed by subdividing the devices into different regions and the operations in each region, along with the interactions at the interfaces, are analyzed using the basic semiconductor physics equations that govern device behavior. The Fourier series solution is used to solve the ambipolar diffusion equation in the lightly doped drift region of the devices. In addition to the external electrical characteristics, internal physical and electrical information, such as junction voltages and carrier distribution in different regions of the device, can be obtained using the models. The instantaneous dissipated power, calculated using the electrical device models, serves as input to the thermal model (RC network with constant and nonconstant thermal resistance and thermal heat capacity, or Fourier thermal model) of the entire module or package, which computes the junction temperature of the device. Once an updated junction temperature is calculated, the temperature-dependent semiconductor material parameters are re-calculated and used with the device electrical model in the next time-step of the simulation. The physics-based electro-thermal models can be used for optimizing device and package design and also for validating extracted parameters of the devices. The thermal model can be used alone for monitoring the junction temperature of a power semiconductor device, and the resulting simulation results used as an indicator of the health and reliability of the semiconductor power device.

Circuit Analysis I CRC Press

This book is an undergraduate level textbook. The prerequisites for this text are first year calculus and physics, and a two-semester course in circuit analysis including the fundamental theorems and the Laplace transformation. This text begins with is an introduction to the nature of small signals used in electronic devices, amplifiers, definitions of decibels, bandwidth, poles and zeros, stability, transfer functions, and Bode plots. It continues with an introduction to solid state electronics, bipolar junction transistors, FETs op amps, integrated devices used in logic circuits, and their internal construction. It concludes with a discussion on amplifier circuits and contains several examples with MATLAB computations and Simulink models. A supplementary text to this title is our Digital Circuit Analysis & Design with Simulink Modeling and

Introduction to CPLDs and FPGAs, ISBN 978-1-934404-06-5. For additional information contact the publisher at info@orchardpublications.com

Some Power Electronics Case Studies Using Matlab Simpowersystem Blockset CRC Press The First Comprehensive, Example-Rich Guide to Power Integrity Modeling Professionals such as signal integrity engineers, package designers, and system architects need to thoroughly understand signal and power integrity issues in order to successfully design packages and boards for high speed systems. Now, for the first time, there's a complete guide to power integrity modeling: everything you need to know, from the basics through the state of the art. Using realistic case studies and downloadable software examples, two leading experts demonstrate today's best techniques for designing and modeling interconnects to efficiently distribute power and minimize noise. The authors carefully introduce the core concepts of power distribution design, systematically present and compare leading techniques for modeling noise, and link these techniques to specific applications. Their many examples range from the simplest (using analytical equations to compute power supply noise) through complex system-level applications. The authors Introduce power delivery network components, analysis, high-frequency measurement, and modeling requirements Thoroughly explain modeling of power/ground planes, including plane behavior, lumped modeling, distributed circuit-based approaches, and much more Offer in-depth coverage of simultaneous switching noise, including modeling for return currents using time- and frequency-domain analysis Introduce several leading time-domain simulation methods, such as macromodeling, and discuss their advantages and disadvantages Present the application of the modeling methods on several advanced case studies that include high-speed servers, high-speed differential signaling, chip package analysis, materials characterization, embedded decoupling capacitors, and electromagnetic bandgap structures This book's system-level focus and practical examples will make it indispensable for every student and professional concerned with power integrity, including electrical engineers, system designers, signal integrity engineers, and materials scientists. It will also be valuable to developers building software that helps to analyze high-speed systems.

Modeling And Electrothermal

Simulation Of Sic Power Devices: Using Silvaco© Atlas

Cambridge University Press

System Simulation Techniques with MATLAB and Simulink comprehensively explains how to use MATLAB and Simulink to perform dynamic systems simulation tasks for engineering and non-engineering applications. This book begins with covering the fundamentals of MATLAB programming and applications, and the solutions to different mathematical problems in simulation. The fundamentals of Simulink modelling and simulation are then presented, followed by coverage of intermediate level modelling skills and more advanced techniques in Simulink modelling and applications. Finally the modelling and simulation of engineering and non-engineering systems are presented. The areas covered include electrical, electronic systems, mechanical systems, pharmacokinetic systems, video and image processing systems and discrete event systems. Hardware-in-the-loop simulation and real-time application are also discussed. Key features: Progressive building of simulation skills using Simulink, from basics through to advanced levels, with illustrations and examples Wide coverage of simulation topics of applications from engineering to non-engineering systems Dedicated chapter on hardware-in-the-loop simulation and real time control End of chapter exercises A companion website hosting a solution manual and powerpoint slides System Simulation Techniques with MATLAB and Simulink is a suitable textbook for senior undergraduate/postgraduate courses covering modelling and simulation, and is also an ideal reference for researchers and practitioners in industry.