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This new book, written by Andre Vladimirescu, who was instrumental in the development of SPICE at the University of California Berkeley, introduces computer simulation of electrical and electronics circuits based on the SPICE standard. Relying on the functionality first supported in SPICE2 that is now supported in all SPICE programs, this text is addressed to all users of electrical simulation. The approach to learning circuit simulation is to interpret simulation results in relation to electrical engineering fundamentals; the book asks the student to solve most circuit examples by hand before verifying the results with SPICE. Addressed to both the SPICE novice and the experienced user, the first six chapters provide the relevant information on SPICE functionality for the analysis of linear as well as nonlinear circuits. Each of these chapters starts out with a linear example accessible to any new user of SPICE and proceeds with nonlinear transistor circuits. The latter part of the book goes into more detail on such issues as functional and hierarchical models, distortion analysis, basic algorithms in SPICE and related options parameters, and, how to direct SPICE to find a solution when it does not converge to a solution. The approach emphasizes that SPICE is not a substitute for knowledge of circuit operation but a complement. The SPICE Book is different from previously published books in the approach of solving circuit problems with a computer. The solution to most circuit examples is sketched out by hand first and followed by a SPICE verification. For more complex circuits it is not feasible to find the solution by hand but the approach stresses the need for the SPICE user tounderstand the results. Readers gain a better comprehension of SPICE thanks to the importance placed on the relation between EE fundamentals and computer simulation. The tutorial approach advances from the hand solution of a circuit to SPICE verification and simulation results interpretation. This book teaches the approach to electrical circuit simulation rather than a specific simulation program. Examples are simulated alternatively with SPICE2, SPICE3 or PSPICE. Accurate descriptions, simulation rationale and cogent explanations make this an invaluable reference.

Global Demand for Streamlined Design and Computation The explosion of wireless communications has generated a tidal wave of interest and development in computational techniques for electromagnetic simulation as well as the design and analysis of RF and microwave circuits. Learn

About Emerging Disciplines, State-of-the-Art Methods 2-D Electromagnetic Simulation of Passive Microstrip Circuits describes this simple procedure in order to provide basic knowledge and practical insight into quotidian problems of microstrip passive circuits applied to microwave systems and digital technologies. The text dissects the latest emerging disciplines and methods of microwave circuit analysis, carefully balancing theory and state-of-the-art experimental concepts to elucidate the process of analyzing high-speed circuits. The author covers the newer techniques such as the study of signal integrity within circuits, and the use of field map interpretations employed in powerful electromagnetic simulation analysis methods. But why and how does the intrinsic two-dimensional simulation model used here reduce numerical error? Step-by-Step Simulation Provides Insight and Understanding The author presents the FDTD electromagnetic simulation method, used to reproduce different microstrip test circuits, as well as an explanation of the complementary electrostatic method of moments (MoM). Each reproduces different microstrip test circuits that are physically constructed and then studied, using a natural methodological progression to facilitate understanding. This approach gives readers a solid comprehension and insight into the theory and practical applications of the microstrip scenario, with emphasis on high-speed interconnection elements.

The editors and authors present a wealth of knowledge regarding the most relevant aspects in the field of MOS transistor modeling. The variety of subjects and the high quality of content of this volume make it a reference document for researchers and users of MOSFET devices and models. The book can be recommended to everyone who is involved in compact model developments, numerical TCAD modeling, parameter extraction, space-level simulation or model standardization. The book will appeal equally to PhD students who want to understand the ins and outs of MOSFETs as well as to modeling designers working in the analog and high-frequency areas.

Engineering productivity in integrated circuit product design and - velopment today is limited largely by the effectiveness of the CAD tools used. For those domains of product design that are highly dependent on transistor-level circuit design and optimization, such as high-speed logic and memory, mixed-signal analog-digital int- faces, RF functions, power integrated circuits, and so forth, circuit simulation is perhaps the single most important tool. As the complexity and performance of integrated electronic systems has increased with scaling of technology feature size, the capabilities and sophistication of the underlying circuit simulation tools have correspondingly increased. The absolute size of circuits requiring transistor-level simulation has increased dramatically, creating not only problems of computing power resources but also problems of task organization, complexity management, output representation, initial condition setup, and so forth. Also, as circuits of more c- plexity and mixed types of functionality are attacked with simu- tion, the spread between time constants or event time scales within the circuit has tended to become wider, requiring new strategies in simulators to deal with large time constant spreads.

A Definitive text on developing circuit simulators Circuit Simulation gives a clear description of the numerical techniques and algorithms that are part of modern circuit simulators, with a focus on the most commonly used simulation modes: DC analysis and transient analysis. Tested in a graduate course on circuit simulation at the University of

Toronto, this unique text provides the reader with sufficient detail and mathematical rigor to write his/her own basic circuit simulator. There is detailed coverage throughout of the mathematical and numerical techniques that are the basis for the various simulation topics, which facilitates a complete understanding of practical simulation techniques. In addition, Circuit Simulation: Explores a number of modern techniques from numerical analysis that are not synthesized anywhere else Covers network equation formulation in detail, with an emphasis on modified nodal analysis Gives a comprehensive treatment of the most relevant aspects of linear and nonlinear system solution techniques States all theorems without proof in order to maintain the focus on the end-goal of providing coverage of practical simulation methods Provides ample references for further study Enables newcomers to circuit simulation to understand the material in a concrete and holistic manner With problem sets and computer projects at the end of every chapter, Circuit Simulation is ideally suited for a graduate course on this topic. It is also a practical reference for design engineers and computer-aided design practitioners, as well as researchers and developers in both industry and academia.

Provides practical examples of circuit design and analysis using PSpice, MATLAB, and the Smith Chart This book presents the three technologies used to deal with electronic circuits: MATLAB, PSpice, and Smith chart. It gives students, researchers, and practicing engineers the necessary design and modelling tools for validating electronic design concepts involving bipolar junction transistors (BJTs), field-effect transistors (FET), OP Amp circuits, and analog filters. Electronic Circuits with MATLAB®, PSpice®, and Smith Chart presents analytical solutions with the results of MATLAB analysis and PSpice simulation. This gives the reader information about the state of the art and confidence in the legitimacy of the solution, as long as the solutions obtained by using the two software tools agree with each other. For representative examples of impedance matching and filter design, the solution using MATLAB and Smith chart (Smith V4.1) are presented for comparison and crosscheck. This approach is expected to give the reader confidence in, and a deeper understanding of, the solution. In addition, this text: Increases the reader's understanding of the underlying processes and related equations for the design and analysis of circuits Provides a stepping stone to RF (radio frequency) circuit design by demonstrating how MATLAB can be used for the design and implementation of microstrip filters Features two chapters dedicated to the application of Smith charts and two-port network theory Electronic Circuits with MATLAB®, PSpice®, and Smith Chart will be of great benefit to practicing engineers and graduate students interested in circuit theory and RF circuits.

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