
Nonlinear Transistor Model Parameter Extraction Te

FET Modeling for Circuit Simulation
 Microwave Electronics
 Third International Workshop on Integrated Nonlinear Microwave and Millimeterwave Circuits
 Medical and Biological Microwave Sensors and Systems
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 Symbolic Analysis Techniques
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 Wiley Encyclopedia of Electrical and Electronics Engineering
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 The RF and Microwave Handbook
 Parameter Extraction and Complex Nonlinear Transistor Models
 Commercial Wireless Circuits and Components Handbook
 Measurement Techniques for Radio Frequency Nanoelectronics
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 Nonlinear Electromagnetic Systems
 Nonlinear Transistor Model Parameter Extraction Techniques
 Modeling and Design Techniques for RF Power Amplifiers
 Microwave De-embedding
 RF and Microwave Semiconductor Device Handbook
 Effects of Self-heating on Parameter Extraction for GaInP/GaAs HBT Nonlinear Models
 X-Parameters
 Overview of Non-linear Device Modelling Methods Based on Vectorial Large-signal Measurements

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FET Modeling for Circuit Simulation CRC Press
 Highlighting the challenges RF and microwave circuit designers face in their day-to-day tasks, *RF and Microwave Circuits, Measurements, and Modeling* explores RF and microwave circuit designs in terms of performance and critical design specifications. The book discusses transmitters and receivers first in terms of functional circuit block and then examines each block individually. Separate articles consider fundamental amplifier issues, low noise amplifiers, power amplifiers for handset applications and high power, power amplifiers. Additional chapters cover other circuit functions including oscillators, mixers, modulators, phase locked loops, filters and multiplexers. New chapters discuss high-power PAs, bit error rate testing, and nonlinear modeling of heterojunction bipolar transistors, while other chapters feature new and updated material that reflects recent progress in such areas as high-volume testing, transmitters and receivers, and CAD tools. The unique behavior

and requirements associated with RF and microwave systems establishes a need for unique and complex models and simulation tools. The required toolset for a microwave circuit designer includes unique device models, both 2D and 3D electromagnetic simulators, as well as frequency domain based small signal and large signal circuit and system simulators. This unique suite of tools requires a design procedure that is also distinctive. This book examines not only the distinct design tools of the microwave circuit designer, but also the design procedures that must be followed to use them effectively.

Microwave Electronics CRC Press

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Third International Workshop on Integrated Nonlinear Microwave and Millimeterwave Circuits Cambridge University Press

A comprehensive source for microwave and wireless circuit design, the Commercial Wireless Circuits and Components Handbook reviews the fundamentals of transmitters and receivers, then presents detailed chapters on individual circuit types. It also covers packaging, large and small signal characterization, and high volume testing techniques for both devices and circuits. This handbook not only provides important information for engineers working with wireless RF or microwave circuitry, it also serves as an excellent source for those requiring information outside of their area of expertise, such as managers, marketers, and technical support workers who need a better understanding of the fields driving their decisions.

Medical and Biological Microwave Sensors and Systems Palala Press

In this comprehensive work, experts in the field detail recent advances in medical and biological microwave sensors and systems, with chapters on topics such as implantable sensors, wearable microwave tags, and UWB technology. Each chapter explores the theory behind the technology, as well as its design and implementation. This is supported by practical examples and details of experimental results, along with discussion of system design, design trade-offs, and possible constraints and manufacturing issues. Applications described include intracranial pressure monitoring, vital signs monitoring, and non-invasive molecular and cellular investigations. Presenting new research and advances in the field, and focusing on the state of the art in medical and biological microwave sensors, this work is an invaluable resource for enthusiastic researchers and practicing engineers in the fields of electrical engineering, biomedical engineering, and medical physics.

Microwave Physics and Techniques Artech House

By 1990 the wireless revolution had begun. In late 2000, Mike Golio gave the world a significant tool to use in this revolution: The RF and Microwave Handbook. Since then, wireless technology spread across the globe with unprecedented speed, fueled by 3G and 4G mobile technology and the proliferation of wireless LANs. Updated to reflect this tremendous growth, the second edition of this widely embraced, bestselling handbook divides its coverage conveniently into a set of three books, each focused on a particular aspect of the technology. Six new chapters cover WiMAX, broadband cable, bit error ratio (BER) testing, high-power PAs (power amplifiers), heterojunction bipolar transistors (HBTs), as well as an overview of microwave engineering. Over 100 contributors, with diverse backgrounds in academic, industrial, government, manufacturing, design, and research reflect the breadth and depth of the field. This eclectic mix of contributors ensures that the coverage balances fundamental technical issues with the important business and marketing constraints that define commercial RF and microwave engineering. Focused chapters filled with formulas, charts, graphs, diagrams, and tables make the information easy to locate and apply to practical cases. The new format, three tightly focused volumes, provides not only increased information but also ease of use. You can find the information you need quickly, without wading through material you don't immediately need, giving you access to the

caliber of data you have come to expect in a much more user-friendly format.

Microwave De-embedding Wiley-Interscience

Achieve higher levels of performance, integration, compactness, and cost-effectiveness in the design and modeling of radio-frequency (RF) power amplifiers. RF power amplifiers are important components of any wireless transmitter, but are often the limiting factors in achieving better performance and lower cost in a wireless communication system—presenting the RF IC design community with many challenges. The next-generation technological advances presented in this book are the result of cutting-edge research in the area of large-signal device modeling and RF power amplifier design at the Georgia Institute of Technology, and have the potential to significantly address issues of performance and cost-effectiveness in this area. Richly complemented with hundreds of figures and equations, *Modeling and Design Techniques for RF Power Amplifiers* introduces and explores the most important topics related to RF power amplifier design under one concise cover. With a focus on efficiency enhancement techniques and the latest advances in the field, coverage includes: Device modeling for CAD Empirical modeling of bipolar devices Scalable modeling of RF MOSFETs Power amplifier IC design Power amplifier design in silicon Efficiency enhancement of RF power amplifiers The description of state-of-the-art techniques makes this book a valuable and handy reference for practicing engineers and researchers, while the breadth of coverage makes it an ideal text for graduate- and advanced undergraduate-level courses in the area of RF power amplifier design and modeling.

International Workshop on Integrated Nonlinear Microwave and Millimeterwave Circuits Cambridge University Press

Microwave Physics and Techniques discusses the modelling and application of nonlinear microwave circuits and the problems of microwave electrodynamics and applications of magnetic and high Tc superconductor structures. Aspects of advanced methods for the structural investigation of materials and of MW remote sensing are also considered. The dual focus on both HTSC MW device physics and MW excitation in ferrites and magnetic films will foster the interaction of specialists in these different fields. *Nonlinear Circuit Simulation and Modeling* Elsevier Inc. Chapters Do you design and build vacuum electron devices, or work with the systems that use them? Quickly develop a solid understanding of how these devices work with this authoritative guide, written by an author with over fifty years of experience in the field. Rigorous in its approach, it focuses on the theory and design of commercially significant types of gridded, linear-beam, crossed-field and fast-wave tubes. Essential components such as waveguides, resonators, slow-wave structures, electron guns, beams, magnets and collectors are also covered, as well as the integration and reliable operation of devices in microwave and RF systems. Complex mathematical analysis is kept to a minimum, and Mathcad worksheets supporting the book online aid understanding of key concepts and connect the theory with practice. Including coverage of primary sources and current research trends, this is essential reading for researchers, practitioners and graduate students working on vacuum electron devices.

Microwave Circuit Design Using Linear and Nonlinear Techniques Palala Press

Classical large-signal device models are indirectly derived from small-signal S-parameter measurements. The recent availability of full two-port vectorial large-signal measurement systems has initiated the development of new techniques to enhance the ease and accuracy of non-linear transistor modelling. In this paper, we

focus to two equivalent circuit based, or "grey" box, transistor modelling methods that are based on vectorial large-signal measurements. We show that the technique of parameter optimisation is interesting to generate fast and accurate nonlinear models for particular applications. The direct extraction method is preferable to determine general non-linear models, but its efficiency is strongly related to the available measurement hardware.

Analysis of the Nonlinear Characteristics of Microwave Power Heterojunction Bipolar Transistors and Optoelectronic Integrated Circuits John Wiley & Sons

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A Fast Sermon on Slavery Cambridge University Press

Discover the concepts, architectures, components, tools, and techniques needed to design millimeter-wave circuits for current and emerging wireless system applications. Focusing on applications in 5G, connectivity, radar, and more, leading experts in radio frequency integrated circuit (RFIC) design provide a comprehensive treatment of cutting-edge physical-layer technologies for radio frequency (RF) transceivers - specifically RF, analog, mixed-signal, and digital circuits and architectures. The full design chain is covered, from system design requirements through to building blocks, transceivers, and process technology. Gain insight into the key novelties of 5G through authoritative chapters on massive MIMO and phased arrays, and learn about the very latest technology developments, such as FinFET logic process technology for RF and millimeter-wave applications. This is an essential reading and an excellent reference for high-frequency circuit designers in both academia and industry.

Fundamentals of RF and Microwave Transistor Amplifiers Elsevier Inc. Chapters

Circuit simulation is widely used for the design of circuits, both discrete and integrated. Device modeling is an important aspect of circuit simulation since it is the link between the physical device and the simulated device. Currently available circuit simulation programs provide a variety of built-in models. Many circuit designers use these built-in models whereas some incorporate new models in the circuit simulation programs. Understanding device modeling with particular emphasis on circuit simulation will be helpful in utilizing the built-in models more efficiently as well as in implementing new models. SPICE is used as a vehicle since it is the most widely used circuit simulation program. However, some issues are addressed which are not directly applicable to SPICE but are applicable to circuit simulation in general. These discussions are useful for modifying SPICE and for understanding other simulation programs. The generic version 2G. 6 is used as a reference for SPICE, although

numerous different versions exist with different modifications. This book describes field effect transistor models commonly used in a variety of circuit simulation programs. Understanding of the basic device physics and some familiarity with device modeling is assumed. Derivation of the model equations is not included. (SPICE is a circuit simulation program available from EECS Industrial Support Office, 461 Cory Hall, University of California, Berkeley, CA 94720.) Acknowledgements I wish to express my gratitude to Valid Logic Systems, Inc.

The RF and Microwave Handbook - 3 Volume Set Springer Science & Business Media

Achieve accurate and reliable parameter extraction using this complete survey of state-of-the-art techniques and methods. A team of experts from industry and academia provides you with insights into a range of key topics, including parasitics, intrinsic extraction, statistics, extraction uncertainty, nonlinear and DC parameters, self-heating and traps, noise, and package effects. Learn how similar approaches to parameter extraction can be applied to different technologies. A variety of real-world industrial examples and measurement results show you how the theories and methods presented can be used in practice. Whether you use transistor models for evaluation of device processing and you need to understand the methods behind the models you use, or you want to develop models for existing and new device types, this is your complete guide to parameter extraction.

1995 IEEE MTT-S International Microwave Symposium Digest Institute of Electrical & Electronics Engineers (IEEE)

A practical, tutorial guide to the nonlinear methods and techniques needed to design real-world microwave circuits.

Electron Technology Cambridge University Press

This chapter aims to describe methodologies and techniques for de-embedding device measurements from extrinsic measurements by characterizing the parasitic network surrounding the intrinsic device, through the use of a three-dimensional (3D) physical model of the network and its electromagnetic (EM) analysis. The electromagnetic behavior is obtained employing 3D EM solvers and internal ports. In the first part, the de-embedding processes for field-effect transistor (FET) devices to be used for monolithic microwave integrated circuit designs are studied by four different approaches; in the second part of this chapter, the de-embedding of FET devices for hybrid circuit design purposes is described.

Microwave and RF Vacuum Electronic Power Sources CRC Press

All model parameters are fundamentally coupled together, so that directly measured individual parameters, although widely used and accepted, may initially only serve as good estimates. This comprehensive resource presents all aspects concerning the modeling of semiconductor field-effect device parameters based on gallium-arsenide (GaAs) and gallium nitride (GaN) technology. Metal-semiconductor field-effect transistors (MESFETs), high electron mobility transistors (HEMTs) and heterojunction bipolar transistors (HBTs), their structures and functions, and existing transistor models are also classified. The Shockley model is presented in order to give insight into semiconductor field-effect transistor (FET) device physics and explain the relationship between geometric and material parameters and device performance. Extraction of trapping and thermal time constants is discussed. A special section is devoted to standard nonlinear FET models applied to large-signal measurements, including static-/pulsed-DC and single-/two-tone stimulation. High power measurement setups for signal waveform measurement, wideband source-/load-pull measurement (including envelope source-/load pull) are also included, along with high-power intermodulation distortion (IMD) measurement setup (including envelope load-pull). Written by a world-renowned expert in the

field, this book is the first to cover of all aspects of semiconductor FET device modeling in a single volume.

Heterojunction Bipolar Transistors for Circuit Design

Cambridge University Press

A highly comprehensive summary on circuit related modeling techniques and parameter extraction methods for heterojunction bipolar transistors Heterojunction Bipolar Transistor (HBT) is one of the most important devices for microwave applications. The book details the accurate device modeling for HBTs and high level IC design using HBTs Provides a valuable reference to basic modeling issues and specific semiconductor device models encountered in circuit simulators, with a thorough reference list at the end of each chapter for onward learning Offers an overview on modeling techniques and parameter extraction methods for heterojunction bipolar transistors focusing on circuit simulation and design Presents electrical/RF engineering-related theory and tools and include equivalent circuits and their matrix descriptions, noise, small and large signal analysis methods Microwave De-embedding Cambridge University Press

Four leaders in the field of microwave circuit design share their newest insights into the latest aspects of the technology The third edition of Microwave Circuit Design Using Linear and Nonlinear Techniques delivers an insightful and complete analysis of microwave circuit design, from their intrinsic and circuit properties to circuit design techniques for maximizing performance in communication and radar systems. This new edition retains what remains relevant from previous editions of this celebrated book and adds brand-new content on CMOS technology, GaN, SiC, frequency range, and feedback power amplifiers in the millimeter range region. The third edition contains over 200 pages of new material. The distinguished engineers, academics, and authors emphasize the commercial applications in telecommunications and cover all aspects of transistor technology. Software tools for design and microwave circuits are included as an accompaniment to the book. In addition to information about small and large-signal amplifier design and power amplifier design, readers will benefit from the book's treatment of a wide variety of topics, like: An in-depth discussion of the foundations of RF and microwave systems, including Maxwell's equations, applications of the technology, analog and digital requirements, and elementary definitions A treatment of lumped and distributed elements, including a discussion of the parasitic effects on lumped elements Descriptions of active devices, including diodes, microwave transistors, heterojunction bipolar transistors, and microwave FET Two-port networks, including S-Parameters from SPICE analysis

and the derivation of transducer power gain Perfect for microwave integrated circuit designers, the third edition of Microwave Circuit Design Using Linear and Nonlinear Techniques also has a place on the bookshelves of electrical engineering researchers and graduate students. It's comprehensive take on all aspects of transistors by world-renowned experts in the field places this book at the vanguard of microwave circuit design research.

Nonlinear Circuit Simulation and Modeling CRC Press

Connect basic theory with real-world applications with this practical, cross-disciplinary guide to radio frequency measurement of nanoscale devices and materials. • Learn the techniques needed for characterizing the performance of devices and their constituent building blocks, including semiconducting nanowires, graphene, and other two dimensional materials such as transition metal dichalcogenides • Gain practical insights into instrumentation, including on-wafer measurement platforms and scanning microwave microscopy • Discover how measurement techniques can be applied to solve real-world problems, in areas such as passive and active nanoelectronic devices, semiconductor dopant profiling, subsurface nanoscale tomography, nanoscale magnetic device engineering, and broadband, spatially localized measurements of biological materials Featuring numerous practical examples, and written in a concise yet rigorous style, this is the ideal resource for researchers, practicing engineers, and graduate students new to the field of radio frequency nanoelectronics.

Transistor Level Modeling for Analog/RF IC Design IOS Press

Discover the nonlinear methods and tools needed to design real-world microwave circuits with this tutorial guide. Balancing theoretical background with practical tools and applications, it covers everything from the basic properties of nonlinear systems such as gain compression, intermodulation and harmonic distortion, to nonlinear circuit analysis and simulation algorithms, and state-of-the-art equivalent circuit and behavioral modeling techniques. Model formulations discussed in detail include time-domain transistor compact models and frequency-domain linear and nonlinear scattering models. Learn how to apply these tools to designing real circuits with the help of a power amplifier design example, which covers all stages from active device model extraction and the selection of bias and terminations, through to performance verification. Realistic examples, illustrative insights and clearly conveyed mathematical formalism make this an essential learning aid for both professionals working in microwave and RF engineering and graduate students looking for a hands-on guide to microwave circuit design.