Nonlinear Microwave Circuit Design

F. Giannini G. Leuzzi



Nonlinear Microwave Circuit Design

Mike Golio

Nonlinear Microwave Circuit Design:

Nonlinear Microwave and RF Circuits Stephen A. Maas,2003 This newly and thoroughly revised edition of the 1988 Artech House classic offers you a comprehensive up to date treatment of nonlinear microwave and RF circuits It gives you a current in depth understanding of the theory of nonlinear circuit analysis with a focus on Volterra series and harmonic balance methods You get practical guidance in designing nonlinear circuits and modeling solid state devices for nonlinear circuit analysis by computer Moreover you learn how characteristics of such models affect the analysis of these circuits

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advice on improving the design quality of microwave passive and active circuits while cutting costs and time Covering all levels of microwave circuit design from the elementary to the very advanced the book systematically presents computer aided methods for linear and nonlinear designs used in the design and manufacture of microwave amplifiers oscillators and mixers Using the newest CAD tools the book shows how to design transistor and diode circuits and also details CAD s usefulness in microwave integrated circuit MIC and monolithic microwave integrated circuit MMIC technology Applications of nonlinear SPICE programs now available for microwave CAD are described State of the art coverage includes microwave transistors HEMTs MODFETs MESFETs HBTs and more high power amplifier design oscillator design including feedback topologies phase noise and examples and more The techniques presented are illustrated with several MMIC designs including a wideband amplifier a low noise amplifier and an MMIC mixer This unique one stop handbook also features a major case study of an actual anticollision radar transceiver which is compared in detail against CAD predictions examples of actual circuit designs with photographs of completed circuits and tables of design formulae **Noise in Linear and** Nonlinear Circuits Stephen A. Maas, 2005 Overcome the effects of noise to push the level of circuit performance with this practical reference Thoroughly explaining the theory of noise in high frequency circuits the book focuses on the real world problems noise creates It provides you with a full understanding of methods for analyzing and minimizing noise in linear and nonlinear circuits The book pays special attention to phase noise in oscillators offering you a comprehensive and accessible treatment of this critical topic Additionally this authoritative volume examines noise in low noise amplifiers mixers and frequency multipliers Nonlinear Circuit Simulation and Modeling José Carlos Pedro, David E. Root, Jianjun Xu, Luís Cótimos Nunes, 2018-06-14 A practical tutorial guide to the nonlinear methods and techniques needed to design real world Microwave Circuit Design Using Linear and Nonlinear Techniques George D. Vend, 2017-07-17 microwave circuits Microwave Circuit Design Using Linear and Nonlinear Techniques By George D Vend Design and Analysis of a Nonlinear Microwave Circuit Using Extended FDTD Method Sung-Woo Lee, 2003 RF / Microwave Circuit Design for Wireless **Applications** Ulrich L. Rohde, Matthias Rudolph, 2013-01-07 Provides researchers and engineers with a complete set of modeling design and implementation tools for tackling the newest IC technologies Revised and completely updated RF Microwave Circuit Design for Wireless Applications Second Edition is a unique state of the art guide to wireless integrated circuit design that provides researchers and engineers with a complete set of modeling design and implementation tools for tackling even the newest IC technologies It emphasizes practical design solutions for high performance devices and circuitry incorporating ample examples of novel and clever circuits from high profile companies Complete with excellent appendices containing working models and CAD based applications this powerful one stop resource Covers the entire area of circuit design for wireless applications Discusses the complete system for which circuits are designed as well as the device technologies on which the devices and circuits are based Presents theory as well as practical issues Introduces wireless

systems and modulation types Takes a systematic approach that differentiates between designing for battery operated devices and base station design RF Microwave Circuit Design for Wireless Applications Second Edition is an indispensable tool for circuit designers engineers who design wireless communications systems and researchers in semiconductor technologies telecommunications and wireless transmission systems Nonlinear Design: FETs and HEMTs Peter H. Ladbrooke, 2021-11-30 Despite its continuing popularity the so called standard circuit model of compound semiconductor field effect transistors FETs and high electron mobility transistors HEMTs is shown to have a limitation for nonlinear analysis and design it is valid only in the static limit When the voltages and currents are time varying as they must be for these devices to have any practical use the model progressively fails for higher specification circuits This book shows how to reform the standard model to render it fully compliant with the way FETs and HEMTs actually function thus rendering it valid dynamically Proof of principle is demonstrated for several practical circuits including a frequency doubler and amplifiers with demanding performance criteria Methods for extracting both the reformulated model and the standard model are described including a scheme for re constructing from S parameters the bias dependent dynamic or RF I V characteristics along which devices work in real world applications and as needed for the design of nonlinear circuits using harmonic balance and time domain simulators The book includes a historical review of how variations on the standard model theme evolved leading up to one of the most widely used the Angelov or Chalmers model Microwave Circuit Modeling <u>Using Electromagnetic Field Simulation</u> Daniel G. Swanson, Wolfgang J. R. Hoefer, 2003 Annotation This practical how to book is an ideal introduction to electromagnetic field solvers Where most books in this area are strictly theoretical this unique resource provides engineers with helpful advice on selecting the right tools for their RF radio frequency and high speed digital circuit design work **RF and Microwave Oscillator Design** Micha Odyniec, 2002 This groundbreaking book is the first to present the state of the art in microwave oscillator design with an emphasis on new nonlinear methods A compilation of pioneering work from experts in the field it also provides rigorous theory and historical background Invaluable for professionals at all levels of design expertise this volume helps you to bridge the gap between design practice and new powerful design methods learn all aspects of modern oscillator design and review practical designs and experimental results Analysis and Design of Autonomous Microwave Circuits Almudena of fixed frequency high Q low noise oscillators Suarez, 2009-02-17 Presents simulation techniques that substantially increase designers control over the oscillationin autonomous circuits This book facilitates a sound understanding of the free running oscillation mechanism the start up from the noise level and the establishment of the steady state oscillation It deals with the operation principles and main characteristics of free running and injection locked oscillators coupled oscillators and parametric frequency dividers Analysis and Design of Autonomous Microwave Circuits provides An exploration of the main nonlinear analysis methods with emphasis on harmonic balance and envelope transient methods Techniques for the efficient simulation of the most common

autonomous regimes A presentation and comparison of the main stability analysis methods in the frequency domain A detailed examination of the instabilization mechanisms that delimit the operation bands of autonomous circuits Coverage of techniques used to eliminate common types of undesired behavior such as spurious oscillations hysteresis and chaos A thorough presentation of the oscillator phase noise A comparison of the main methodologies of phase noise analysis Techniques for autonomous circuit optimization based on harmonic balance A consideration of different design objectives presetting the oscillation frequency and output power increasing efficiency modifying the transient duration and imposing operation bands Analysis and Design of Autonomous Microwave Circuits is a valuable resource for microwave designers oscillator designers and graduate students in RF microwave design The RF and Microwave Handbook Mike Golio.2000-12-20 The recent shift in focus from defense and government work to commercial wireless efforts has caused the job of the typical microwave engineer to change dramatically The modern microwave and RF engineer is expected to know customer expectations market trends manufacturing technologies and factory models to a degree that is unprecedented in RF and Microwave Circuits, Measurements, and Modeling Mike Golio, Janet Golio, 2018-10-08 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 **Neural Based Modeling** of Nonlinear Microwave Devices and Circuits [microform] Jianjun Xu,2004 International Workshop on Integrated Nonlinear Microwave and Millimeterwave Circuits ,1994 RF Circuits for 5G Applications Sangeeta Singh, Rajeev Kumar Arya, B. C. Sahana, Ajay Kumar Vyas, 2023-03-10 RF CIRCUITS FOR 5G APPLICATIONS This book addresses FinFET based analog IC designing for fifth generation 5G communication networks and highlights the latest advances problems and challenges while presenting the latest research results in the field of mmwave integrated circuits designing The wireless

communication sector is experiencing exponential expansion particularly in the areas of mobile data and the 5G mobile network creating fresh market possibilities for designing the integrated circuits ICs needed in the industry Drawing from scientific literature and practical realization this book explores FinFET based analog IC designing for 5G communication networks and considers the latest breakthroughs and obstacles It also presents the recent research trends and future roadmaps for the 5G communication circuits RF Circuits for 5G Applications includes design guidelines to be considered when designing these circuits and detrimental scaling effects of the same In addition to enhance the usability of this book the editors have included real time problems in RFIC designing and case studies from experimental results as well as clearly demarcated design guidelines for the 5G communication ICs designing Audience The primary target audience includes researchers postgraduate students and industry professionals pursuing specializations in RF engineering electronics engineering electrical engineering information and communication technology

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