Current Mode Analog Integrated Circuits And Linearization Techniques In Cmos Technology

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This volume of Analog Circuit Design concentrates on three topics: Low-Noise, Low-Power, Low-Voltage; Mixed-Mode Design with CAD Tools; Voltage, Current, and Time References. The book contains six papers on each topic, written by internationally recognised experts. The papers are tutorial in nature and make a substantial contribution to improving the design of analog circuits. The book is divided into three parts. Part I, `Low-Noise, Low-Power, Low-Voltage', concentrates on the problems of the matching properties of high frequency MOS circuits caused by the continuous reduction in the size of integrated devices. These problems are considered in light of maintaining the benefits of greater bandwidth and lower power consumption. Part II, `Mixed Mode Design with CAD Tools', looks at the practicalities of providing CAD tools for circuits containing both digital and analog elements. The papers consider both the simulation and synthesis aspects of designing CAD tools suitable for such designs. Part III, `Voltage, Current and

Time References' contains much new and exciting material describing all aspects of these reference circuits. Audience: An essential reference source for analog design engineers and researchers wishing to keep abreast with the latest developments in the field. The tutorial nature of the contributions also makes it suitable for use in an advanced course. Featuring hundreds of illustrations and references, this volume in the third edition of the Circuits and Filters Handbook, provides the latest information on analog and VLSI circuits, omitting extensive theory and proofs in favor of numerous examples throughout each chapter. The first part of the text focuses on analog integrated circuits, presenting up-to-date knowledge on monolithic device models, analog circuit cells, high performance analog circuits, RF communication circuits, and PLL circuits. In the second half of the book, well-known contributors offer the latest findings on VLSI circuits, including digital systems, data converters, and systolic arrays. This book describes a variety of current feedback operational amplifier (CFOA) architectures and their applications in analog signal processing/generation. Coverage includes a comprehensive survey

of commercially available, off-the-shelf integrated circuit CFOAs, as well as recent advances made on the design of CFOAs, including design innovations for bipolar and CMOS CFOAs. This book serves as a single-source reference to the topic, as well as a catalog of over 200 application circuits which would be useful not only for students, educators and researchers in apprising them about the recent developments in the area but would also serve as a comprehensive repertoire of useful circuits for practicing engineers who might be interested in choosing an appropriate CFOA-based topology for use in a given application.

Current-mode Analog Integrated Circuits and Linearization Techniques in CMOS Technology

Low-Voltage Low-Power CMOS Current Conveyors

Model and Design of Bipolar and MOS Current-Mode Logic

Switched-Current Signal Processing and A/D Conversion Circuits

Analysis and Design of Analog Integrated Circuits, 5th Edition

Low-Voltage CMOS Log Companding Analog Design presents in detail state-of-the-art analog circuit techniques for the very low-voltage and low-power design of systems-on-chip in CMOS technologies. The

proposed strategy is mainly based on two bases: the Instantaneous Log Companding Theory, and the MOSFET operating in the subthreshold region. The former allows inner compression of the voltage dynamic-range for very low-voltage operation, while the latter is compatible with CMOS technologies and suitable for low-power circuits. The required background on the specific modeling of the MOS transistor for Companding is supplied at the beginning. Following this general approach, a complete set of CMOS basic building blocks is proposed and analyzed for a wide variety of analog signal processing. In particular, the covered areas include: amplification and AGC, arbitrary filtering, PTAT generation, and pulse duration modulation (PDM). For each topic, several case studies are considered to illustrate the design methodology. Also, integrated examples in 1.2um and 0.35um CMOS technologies are reported to verify the good agreement between design equations and experimental data. The resulting analog circuit topologies exhibit very low-voltage (i.e. 1V) and low-power (few tenths of uA) capabilities. Apart from these specific design examples, a real industrial application in the field of hearing aids is also presented as the main demonstrator of all the proposed basic building blocks. This system-on-chip exhibits true 1V operation, high flexibility through digital programmability and very low-power consumption (about 300uA including the Class-D amplifier). As a result, the reported ASIC can meet the specifications of a complete family of common hearing aid models. In conclusion, this book is addressed to both industry ASIC designers who can

apply its contents to the synthesis of very low-power systems-on-chip in standard CMOS technologies, as well as to the teachers of modern circuit design in electronic engineering.

This book presents theory, design methods and novel applications for integrated circuits for analog signal processing. The discussion covers a wide variety of active devices, active elements and amplifiers, working in voltage mode, current mode and mixed mode. This includes voltage operational amplifiers, current operational amplifiers, operational transconductance amplifiers, operational transresistance amplifiers, current conveyors, current differencing transconductance amplifiers, etc. Design methods and challenges posed by nanometer technology are discussed and applications described, including signal amplification, filtering, data acquisition systems such as neural recording, sensor conditioning such as biomedical implants, actuator conditioning, noise generators, oscillators, mixers, etc. Presents analysis and synthesis methods to generate all circuit topologies from which the designer can select the best one for the desired application; Includes design guidelines for active devices/elements with low voltage and low power constraints; Offers guidelines for selecting the right active devices/elements in the design of linear and nonlinear circuits; Discusses optimization of the active devices/elements for process and manufacturing issues of nanometer technology.

Analog Signal Processing brings together in one place important contributions and state-of-the-art research results in this rapidly advancing area. Analog Signal

Processing serves as an excellent reference, providing insight into some of the most important issues in the field.

This volume of Analog Circuit Design concentrates on three topics: Volt Electronics; Design and Implementation of Mixed-Mode Systems; Low-Noise and RF Power Amplifiers for Telecommunication. The book comprises six papers on each topic written by internationally recognised experts. These papers are tutorial in nature and together make a substantial contribution to improving the design of analog circuits. The book is divided into three parts: Part I, Volt Electronics, presents some of the circuit design challenges which are having to be met as the need for more electronics on a chip forces smaller transistor dimensions, and thus lower breakdown voltages. The papers cover techniques for 1-Volt electronics. Part II, Design and Implementation of Mixed-Mode Systems, deals with the various problems that are encountered in mixed analog-digital design. In the future, all integrated circuits are bound to contain both digital and analog sub-blocks. Problems such as substrate bounce and other substrate coupling effects cause deterioration in signal integrity. Both aspects of mixed-signal design have been addressed in this section and it illustrates that careful layout techniques embedded in a hierarchical design methodology can allow us to cope with most of the challenges presented by mixed analog-digital design. Part III, Low-noise and RF Power Amplifiers for Telecommunication, focuses on telecommunications systems. In these systems low-noise amplifiers are front-

ends of receiver designs. At the transmitter part a high-performance, high-efficiency power amplifier is a critical design. Examples of both system parts are described in this section. Analog Circuit Design is an essential reference source for analog design engineers and researchers wishing to keep abreast with the latest developments in the field. The tutorial nature of the contributions also makes it suitable for use in an advanced course.

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The Designer's Companion

Current Feedback Operational Amplifiers and Their Applications

Low-Voltage CMOS Log Companding Analog Design

Analog Integrated Circuit Design

This book brings together leading researchers to highlight recent advances and identify promising directions for future development. Motivated by the market for mobile and wireless communications, fully integrated analog filters for high-frequency applications are now receiving great interest world-wide. Chapters are dedicated to MOSFET-C and Gm-C filters, current-mode continuous-time filters, log-domain filters, switched-current filters, adaptive filters and on-chip automatic tuning. The topical nature of the book and caliber of the authors ensures that this book will be of wide interest to the electronics community world-wide.

Analog Design Issues in Digital VLSI Circuits and Systems brings together in one place important

contributions and up-to-date research results in this fast moving area. Analog Design Issues in Digital VLSI Circuits and Systems serves as an excellent reference, providing insight into some of the most challenging research issues in the field.

This book contains the revised contributions of all the speakers of the fifth AACD Workshop which was held in Lausanne on April 2-4, 1996. It was organized by Dr Vlado Valence of the EPFL University and MEAD of Lausanne. The program consisted of six tutorials per day during three days. The tutorials were presented by experts in the field. They were selected by a program committee consisting of Prof. Willy Sansen of the Katholieke Universiteit Leuven, Prof. Rudy van de Plassche of Philips Research and the University of Technology Eindhoven and Prof. 10han Huijsing of the Delft University of Technology. The three topics mentioned above have been selected because of their importance in present days analog design. The other topics that have been discussed before are: in 1992 : Operational amplifiers Analog to digital convereters Analog computer aided design in 1993 : Mixed AID cicuit design Sensor interface circuits Communication circuits in 1994 : Low-power low-voltage design Integrated filters Smart power circuits in 1995 : Low-noise, low-power, low-voltage design Mixed-mode design with CAD tools Voltage, current and time references Each AACD workhop has given rise to the publication of a book by Kluwer entitled "Analog Circuit Design". This is thus the fifth book. This series of books provides a valuable overview of all analog circuit design techniques and achievements. It is a reference for whoever is engaged in this discipline.

The Fifth Edition of this academically rigorous text provides a comprehensive treatment of analog integrated circuit analysis and design starting from the basics and through current industrial practices. The authors combine bipolar, CMOS and BiCMOS analog integrated-circuit design into a unified treatment that stresses their commonalities and highlights their differences. The comprehensive coverage of the material will provide the student with valuable insights into the relative strengths and weaknesses of these important technologies.

Issues in Electronic Circuits, Devices, and Materials: 2011 Edition

Low-Noise, Low-Power, Low-Voltage; Mixed-Mode Design with CAD Tools; Voltage, Current and Time References

Low-frequency Analog Integrated Circuit Design Using Current-mode Techniques

CMOS Current Amplifiers

Design of High Frequency Integrated Analogue Filters

This book deals with the analysis and design of CMOS current-mode circuits for data communications. CMOS current-mode sampled-data networks, i.e. switched-current circuits, are excluded. Major subjects covered in the book include: a critical comparison of voltage-mode and current-mode circuits; the building blocks of current-mode circuits: design techniques; modeling of wire channels, electrical signaling for Gbps data communications; ESD protection for current-mode circuits and more. This book will appeal to IC design engineers, hardware system engineers and others.

This is the only comprehensive book in the market for engineers that covers the design of CMOS and bipolar analog integrated circuits. The fifth edition retains its completeness

and updates the coverage of bipolar and CMOS circuits. A thorough analysis of a new low-voltage bipolar operational amplifier has been added to Chapters 6, 7, 9, and 11. Chapter 12 has been updated to include a fully differential folded cascode operational amplifier example. With its streamlined and up-to-date coverage, more engineers will turn to this resource to explore key concepts in the field. Current-mode circuits have become very important in the design of high-speed analog integrated circuits that are highly linear and possess a wide dynamic-range. Efficient design of current-mode (CM) filters is still a major challenge to the designer. Considerable researcher efforts have been made for the realization of current-mode filters from the existing voltage-mode (VM) filters. In 1971, Bhattacharyya and Swamy introduced the principle of network transposition, which has led to a very efficient way to convert a voltage-mode circuit to a current-mode circuit with the same transfer function, and with a one-to-one correspondence between the elements of the two circuits. In this thesis, using the concepts of the transposed networks, and the nullator-norator representation for active devices, it is shown that a voltage-mode filter implemented using an operational amplifier (OA) can be very easily converted to a current-mode filter using the same OA, when the OA is configured as a three-terminal element. The effects of the finite gain bandwidth of the OA on the CM and VM filters are studied. If the OA is configured as a four-terminal device in a voltage-mode filter, it is shown that the corresponding current-mode filter can be implemented using an operational floating amplifier (OFA), which is a practical realization of a four-terminal nullor. The theoretical analysis about the proposed method is verified by using simulation results as well as by practical experiment using discrete components, such as resistors, capacitors and LM741 (OA) devices. Finally, an OFA is designed and laid out

using 0.18 ?m CMOS technology to validate the design of a current-mode filter using the OFA as the four-terminal nullor. Simulations as well as the experimental results show very good agreement with the theoretical analysis.

The 2nd Edition of Analog Integrated Circuit Design focuses on more coverage about several types of circuits that have increased in importance in the past decade. Furthermore, the text is enhanced with material on CMOS IC device modeling, updated processing layout and expanded coverage to reflect technical innovations. CMOS devices and circuits have more influence in this edition as well as a reduced amount of text on BiCMOS and bipolar information. New chapters include topics on frequency response of analog ICs and basic theory of feedback amplifiers.

Operational Amplifiers and Analog Multipliers

Trends in Circuit Design for Analog Signal Processing

Analogue IC Design

Field-Programmable Analog Arrays

Trade-Offs in Analog Circuit Design

This book describes the design of low-voltage analog integrated filters using current mirrors, one of the most common building blocks both in analog and mixed-signal VLSI circuits, offering the advantages of low-voltage operation, derivation of resistorless topologies and electronic adjustment capability of their frequency characteristics. Several design examples are described, using current mirrors that fulfill the requirements of modern low-power wireless and biomedical applications, such as universal biquadratic filter topologies, complex filters for Bluetooth/ZigBee low-IF receivers and Wavelet filters for cardiac signal detection. The experimental results from the fabricated chips will also be

presented, showing their utility in modern low-voltage low-power portable devices.

Current-Mode digital circuits have been extensively analyzed and used since the early days of digital ICs. In particular, bipolar Current-Mode digital circuits emerged as an approach to realize digital circuits with the highest speed. Together with its speed performance, CMOS Current-Mode logic has been rediscovered to allow logic gates implementations which, in contrast to classical VLSI CMOS digital circuits, have the feature of low noise level generation. Thus, CMOS Current-Mode gates can be efficiently used inside analog and mixed-signal ICs, which require a low noise silicon environment. For these reasons, until today, many works and results have been published which reinforce the importance of Current-Mode digital circuits. In the topic of Current-Mode digital circuits, the authors spent a lot of effort in the last six years, and their original results highly enhanced both the modeling and the related design methodologies. Since the fundamental Current-Mode logic building block is the classical differential amplifier, the winning idea, that represents the starting point of the authors ' research, was to change the classical point of view typically followed in the investigation and design of Current-Mode digital circuits. In particular, they properly exploited classical paradigms developed and used in the analog circuit domain (a topic in which one of the authors maturated a great experience).

As the requirements for low power consumption and very small physical dimensions in portable, wearable and

implantable medical devices are calling for integrated circuit design techniques using MOSFETs operating in the subthreshold regime, this book first revisits some well-known circuit techniques that use CMOS devices biased in subthreshold in order to establish nanopower integrated circuit designs. Based on the these findings, this book shows the development of a class-AB current-mode sample-and-hold circuit with an order of magnitude improvement in its figure of merit compared to other state-of-the-art designs. Also, the concepts and design procedures of 1) single-branch filters 2) follower-integrator-based lowpass filters and 3) modular transconductance reduction techniques for very low frequency filters are presented. Finally, to serve the requirement of a very large signal swing in an energy-based action potential detector, a nanopower class-AB current-mode analog multiplier is designed to handle input current amplitudes of more than 10 times the bias current of the multiplier circuit. The invented filter circuits have been fabricated in a standard 0.18 μ CMOS process in order to verify our circuit concepts and design procedures. Their experimental results are reported.

This concise and modern book on current conveyors considers first and second-generation devices in a general environment and for low-voltage low-power applications. It constitutes an excellent reference for analogue designers and researchers and is suitable as a textbook in an advanced course on microelectronics.

Analog IC Design Techniques for Nanopower Biomedical Signal Processing

Integrated Filters for Short Range Wireless and Biomedical Applications

Analog Circuits and Systems for Voltage-Mode and Current-Mode Sensor Interfacing Applications

CML, ECL and SCL Digital Circuits

Design and Implementation

Switched-Current Signal Processing and A/D Conversion Circuits: Design and Implementation describes the design and implementation of switched-current (SI) circuits with emphasis on signal processing and data-conversion applications. The work includes theoretical analysis, high-level and circuit-level simulation results as well as measurement results from a few of the author's circuit implementations. An extensive overview of the SI field of research is also given. The book contains an extensive overview of the switched-current field of research, and can therefore be used as a quick-reference to the field. The description of each design example has been organized to describe the entire design flow from system level design and simulation, to circuit simulation, layout and measurement as accurately as possible. Thus it is possible to follow each step in the design process. Switched-Current Signal Processing and A/D Conversion Circuits: Design and Implementation is an invaluable reference for researchers and circuit designers working with one-chip mixed-signal system solutions, and low-voltage analog CMOS design. It will also be appreciated by anyone requiring a quick overview of what has been done in the SI field. Field-Programmable Analog Arrays brings together in one place important contributions and up-to-date

research results in this fast moving area. Field-Programmable Analog Arrays serves as an excellent reference, providing insight into some of the most challenging research issues in the field.
Symbolic Analysis in Analog Integrated Circuit Design provides an introduction to computer-aided circuit analysis and presents systematic methods for solving linear (i.e. small-signal) and nonlinear circuit problems, which are illustrated by concrete examples. Computer-aided symbolic circuit analysis is useful in analog integrated circuit design. Analytic expressions for the network transfer functions contain information that is not provided by a numerical simulation result. However, these expressions are generally extremely long and difficult to interpret; therefore, it is necessary to be able to approximate them guided by the magnitude of the individual circuit parameters. Engineering has been described as `the art of making approximations'. The inclusion of symbolic analysis in analog circuit design reduces the implied risk of ambiguity during the approximation process. A systematic method based on the nullor concept is used to obtain the basic feedback transistor amplifier configurations. Approximate expressions for the locations of poles and zeros for linear networks are obtained using the extended pole-splitting technique. An unusual feature in Symbolic Analysis in Analog Integrated Circuit Design is the consistent use of the transadmittance element with finite (linear or nonlinear) or infinite (i.e. nullor) gain as the only requisite circuit element. The describing function method is used to obtain approximate symbolic expressions for the harmonic distortion

generated by a soft or hard transconductance nonlinearity embedded in an arbitrary linear network. The design and implementation of a program (i.e. CASCA) for symbolic analysis of time-continuous networks is described. The algorithms can also be used to solve other linear problems, e.g. the analysis of time-discrete switched-capacitor networks. Symbolic Analysis in Analog Integrated Circuit Design serves as an excellent resource for students and researchers as well as for industry designers who want to familiarize themselves with circuit analysis. This book may also be used for advanced courses on the subject.

Analog CMOS Microelectronic Circuits describes novel approaches for analog electronic interfaces design, especially for resistive and capacitive sensors showing a wide variation range, with the intent to cover a lack of solutions in the literature. After an initial description of sensors and main definitions, novel electronic circuits, which do not require any initial calibrations, are described; they show both AC and DC excitation voltage for the employed sensor, and use both voltage-mode and current-mode approaches. The proposed interfaces can be realized both as prototype boards, for fast characterization (in this sense, they can be easily implemented by students and researchers), and as integrated circuits, using modern low-voltage low-power design techniques (in this case, specialist analog microelectronic researchers will find them useful). The primary audience of Analog CMOS Microelectronic Circuits are: analog circuit designers, sensor companies, Ph.D. students on analog microelectronics, undergraduate and postgraduate

students in electronic engineering.

Analog Integrated Circuits

Symbolic Analysis in Analog Integrated Circuit Design

CMOS Current-Mode Circuits for Data Communications

Volt Electronics; Mixed-Mode Systems; Low-Noise and RF Power Amplifiers for Telecommunication

MOST RF Circuits, Sigma-Delta Converters and Translinear Circuits

As the frequency of communication systems increases and the dimensions of transistors are reduced, more and more stringent performance requirements are placed on analog circuits. This is a trend that is bound to continue for the foreseeable future and while it does, understanding performance trade-offs will constitute a vital part of the analog design process. It is the insight and intuition obtained from a fundamental understanding of performance conflicts and trade-offs, that ultimately provides the designer with the basic tools necessary for effective and creative analog design. Trade-offs in Analog Circuit Design, which is devoted to the understanding of trade-offs in analog design, is quite unique in that it draws together fundamental material from, and

identifies interrelationships within, a number of key analog circuits. The book covers ten subject areas: Design methodology, Technology, General Performance, Filters, Switched Circuits, Oscillators, Data Converters, Transceivers, Neural Processing, and Analog CAD. Within these subject areas it deals with a wide diversity of trade-offs ranging from frequency-dynamic range and power, gain-bandwidth, speed-dynamic range and phase noise, to tradeoffs in design for manufacture and IC layout. The book has by far transcended its original scope and has become both a designer's companion as well as a graduate textbook. An important feature of this book is that it promotes an intuitive approach to understanding analog circuits by explaining fundamental relationships and, in many cases, providing practical illustrative examples to demonstrate the inherent basic interrelationships and trade-offs. Trade-offs in Analog Circuit Design draws together 34 contributions from some of the world's most eminent analog circuits-and-systems designers to provide, for the

first time, a comprehensive text devoted to a very important and timely approach to analog circuit design. Environmental electromagnetic pollution has drastically increased over the last decades. The omnipresence of communication systems, various electronic appliances and the use of ever increasing frequencies, all contribute to a noisy electromagnetic environment which acts detrimentally on sensitive electronic equipment. Integrated circuits must be able to operate satisfactorily while cohabiting harmoniously in the same appliance, and not generate intolerable levels of electromagnetic emission, while maintaining a sound immunity to potential electromagnetic disturbances: analog integrated circuits are in particular more easily disturbed than their digital counterparts, since they don't have the benefit of dealing with predefined levels ensuring an innate immunity to disturbances. The objective of the research domain presented in EMC of Analog Integrated Circuits is to improve the electromagnetic immunity of considered analog integrated circuits,

so that they start to fail at relevantly higher conduction levels than before.

This book covers a detailed study of Operational Transconductance Amplifier (OTA) based circuits, their realizations and applications. The book is primarily concerned with the building blocks and their applications in linear and nonlinear circuit design, presented in a simplified and methodical way. The book comprises nine chapters, covers important building blocks, ideal and non-ideal component simulators.

This book is dedicated to the analysis and design of analog CMOS nonlinear function synthesizer structures, based on original superior-order approximation functions. A variety of analog function synthesizer structures are discussed, based on accurate approximation functions. Readers will be enabled to implement numerous circuit functions with applications in analog signal processing, including exponential, Gaussian or hyperbolic functions. Generalizing the methods for obtaining these particular functions,

the author analyzes superior-order approximation functions, which represent the core for developing CMOS analog nonlinear function synthesizers.
Analog and VLSI Circuits
Analysis and Design of Analog Integrated Circuits
Current-Mode Instrumentation Amplifiers
Analog Design Issues in Digital VLSI Circuits and Systems
Current-Mode Analog Nonlinear Function Synthesizer Structures

Analog Integrated Circuits deals with the design and analysis of modem analog circuits using integrated bipolar and field-effect transistor technologies. This book is suitable as a text for a one-semester course for senior level or first-year graduate students as well as a reference work for practicing engin eers. Advanced students will also find the text useful in that some of the material presented here is not covered in many first courses on analog circuits. Included in this is an extensive coverage of feedback amplifiers, current-mode circuits, and translinear circuits. Suitable background would be fundamental courses in electronic circuits and semiconductor devices. This book contains numerous examples, many of which include commercial analog circuits. End-of-chapter problems are given, many illustrating practical circuits. Chapter 1 discuses the models commonly used to represent devices used in modem analog

integrated circuits. Presented are models for bipolar junction transistors, junction diodes, junction field-effect transistors, and metal-oxide semiconductor field-effect transistors. Both large-signal and small-signal models are developed as well as their implementation in the SPICE circuit simulation program. The basic building blocks used in a large variety of analog circuits are analyzed in Chapter 2; these consist of current sources, dc level-shift stages, single-transistor gain stages, two-transistor gain stages, and output stages. Both bipolar and field-effect transistor implementations are presented. Chapter 3 deals with operational amplifier circuits. The four basic op-amp circuits are analyzed: (1) voltage-feedback amplifiers, (2) current-feedback amplifiers, (3) current-differencing amplifiers, and (4) transconductance ampli fiers. Selected applications are also presented. CMOS Current Amplifiers presents design strategies for high performance current amplifiers based on CMOS technology. After an introduction to various architectures of operational amplifiers, the operating principles of the current amplifier are outlined. This book provides the reader with simple and compact design equations for use in a pencil and paper design and the following simulation step. Chapter 1 introduces the general aspects of current amplifiers. After a preliminary classification of operational amplifiers, ideal blocks and models are discussed for different architectures and a first high-level comparison is made between traditional amplifiers and current amplifiers. Analysis and examples of basic

circuits, as well as signal processing applications involving current amplifiers, are also given. Non-idealities and second- order effects causing limitations in performance are then discussed and evaluated. Chapter 2 focuses on low-drive current amplifiers. Several design examples for current conveyors and class A current amplifiers are discussed in detail and design equations are presented for the main performance parameters, which allows a good trade-off between requirements. High-performance solutions for high bandwidth and low voltage capability are also considered, and, finally, current comparators with progressively enhanced performance are reported and analyzed critically. Chapter 3 deals with current amplifiers for off-chip loads. Several class AB current-mode output stages are discussed and design strategies which improve performance are presented. A detailed analysis of non-ideal effect is carried out with particular emphasis on linearity. Design examples are given and circuit arrangements for further developments are included. CMOS Current Amplifiers serves as an excellent reference for researchers and professionals of analog IC design, and may also be used as an advanced text on current amplifiers. Analogue IC Design has become the essential title covering the current-mode approach to integrated circuit design. The approach has sparked much interest in analogue electronics and is linked to important advances in integrated circuit technology, such as CMOS VLSI which allows mixed analogue and digital circuits and high-speed GaAs processing.

This book describes a new way to design and utilize Instrumentation Amplifiers (IAs) by taking advantages of the current-mode (CM) approach. For the first time, all different topologies of CMIAs are discussed and compared, providing a single-source reference for instrumentation and measurement experts who want to choose a topology for a specific application. The authors also explain major challenges in designing CMIAs, so the book can be useful for anyone studying instrumentation amplifiers, and even other analog circuits. Coverage also includes various CM signal processing techniques employed in CMIAs, and applications of the CMIAs in biomedical and data acquisition are demonstrated.

Analog Signal Processing

Integrated Circuits for Analog Signal Processing

The Current-mode Approach

EMC of Analog Integrated Circuits

Textbook Of Operational Transconductance Amplifier And Analog Integrated Circuits