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Edited by

Michael Peter Kennedy
Riccardo Rovatto
Gianluca Setti



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Chaotic Electronics In Telecommunications

**Michael Kennedy, Riccardo
Rovatti, Gianluca Setti**



Chaotic Electronics In Telecommunications:

Chaotic Electronics in Telecommunications Michael Kennedy, 2017 At the code level discrete time chaotic systems can be used to generate spreading codes for DS SS systems At the signal level continuous time chaotic systems can be used to generate wideband carriers for digital modulation schemes The potential of chaos engineering is now recognized worldwide with research groups actively pursuing the exploitation of chaotic phenomena in cryptography spread spectrum communications electromagnetic interference reduction and many other applications Although some noteworthy results have already been achieved until now the field has lacked both a systematic treatment of these developments and a careful quantitative comparison of chaos based and conventional techniques Chaotic Electronics in Telecommunications fills both of those needs It addresses the use of chaos in digital communications applications from the coding level to circuit design Each chapter offers a formal exposition of the theoretical and engineering tools needed to apply chaos followed by discussion of the algorithms and circuits needed to apply the theory to real world communications systems Provided by publisher

Chaotic Electronics in Telecommunications Michael Kennedy, Riccardo Rovatti, Gianluca Setti, 2018-10-03 At the code level discrete time chaotic systems can be used to generate spreading codes for DS SS systems At the signal level continuous time chaotic systems can be used to generate wideband carriers for digital modulation schemes The potential of chaos engineering is now recognized worldwide with research groups actively pursuing the exploitation of chaotic phenomena in cryptography spread spectrum communications electromagnetic interference reduction and many other applications Although some noteworthy results have already been achieved until now the field has lacked both a systematic treatment of these developments and a careful quantitative comparison of chaos based and conventional techniques Chaotic Electronics in Telecommunications fills both of those needs It addresses the use of chaos in digital communications applications from the coding level to circuit design Each chapter offers a formal exposition of the theoretical and engineering tools needed to apply chaos followed by discussion of the algorithms and circuits needed to apply the theory to real world communications systems

Chaos-Based Digital Communication Systems Francis C.M. Lau, Chi K. Tse, 2013-03-09 In the 1970 s and 1980 s we saw phenomenal advancement in nonlinear science which had led to many important discoveries that greatly improve our understanding of the physical world Among them the discovery of chaos in deterministic systems is unarguably one of the most revolutionary scientific findings We are now able to explain the apparent complexity and subtle order exhibited by many physical systems under the unified framework of chaos theory The past decade has seen heightened interest in the exploitation of chaos for useful applications in engineering systems One application area that has attracted a great deal of attention is communications Chaotic signals by virtue of their wide band characteristic are natural candidates for carrying information in a spread spectrum communication environment The use of chaotic signals in communications thus naturally inherits the advantages that are currently being offered by conventional spread spectrum communication systems such as

robustness in multi path environments resistance to jam ming low probability of interception etc In addition chaotic signals are easy to generate and hence offer a potentially low cost solution to spread spectrum communications Although many practical problems need to be solved before chaos based communications can be realized in practice the field has advanced rapidly during the past few years and it now reaches a point where abstract concepts from physics and mathematics have been fruitfully ported to techniques that allow information to be carried by chaotic signals

Synchronization

Techniques for Chaotic Communication Systems Branislav Jovic, 2011-08-20 Since the early 1990s when synchronization of chaotic communication systems became a popular research subject a vast number of scientific papers have been published However most of today s books on chaotic communication systems deal exclusively with the systems where perfect synchronization is assumed an assumption which separates theoretical from practical real world systems This book is the first of its kind dealing exclusively with the synchronization techniques for chaotic communication systems It describes a number of novel robust synchronization techniques which there is a lack of for single and multi user chaotic communication systems published and highly cited in world s leading journals in the area In particular it presents a solution to the problem of robust chaotic synchronization by presenting the first fully synchronized highly secure chaos based DS CDMA system The book fills a gap in the existing literature where a number of books exist that deal with chaos and chaotic communications but not with synchronization of chaotic communication systems It also acts as a bridge between communication system theory and chaotic synchronization by carefully explaining the two concepts and demonstrating how they link into chaotic communication systems The book also presents a detailed literature review on the topic of synchronization of chaotic communication systems Furthermore it presents the literature review on the general topic of chaotic synchronization and how those ideas led to the application of chaotic signals to secure chaotic communication systems It therefore in addition to presenting the state of the art systems also presents a detailed history of chaotic communication systems In summary the book stands out in the field of synchronization techniques for chaotic communication systems

Reconstruction of Chaotic Signals with Applications to Chaos-based Communications Jiu Chao Feng, Chi Kong Tse, 2008 This book provides a systematic review of the fundamental theory of signal reconstruction and the practical techniques used in reconstructing chaotic signals Specific applications of signal reconstruction methods in chaos based communications are expounded in full detail along with examples illustrating the various problems associated with such applications The book serves as an advanced textbook for undergraduate and graduate courses in electronic and information engineering automatic control physics and applied mathematics It is also highly suited for general nonlinear scientists who wish to understand the basics of chaos based signal and information processing Written with numerous illustrative applications to capture the interest of casual readers the book also contains adequate theoretical rigor to provide the necessary foundational as well as advanced material for serious researchers who are working or aspire to work in this area

Signal Processing for Mobile Communications

Handbook Mohamed Ibnkahla, 2004-08-16 In recent years a wealth of research has emerged addressing various aspects of mobile communications signal processing New applications and services are continually arising and future mobile communications offer new opportunities and exciting challenges for signal processing The Signal Processing for Mobile Communications Handbook provides *Telecommunication Networks* Mohammad Abdul Matin, 2019-02-27 The demand for advance telecommunication services has increased dramatically over the last few years This has led to technological changes with revolutionized engineering strategies to optimize network construction and operation Telecommunication networks integrate with a wide range of technologies including optical amplifiers software architectures for network control and management abstract algebra required to design error correction codes and network modeling This book presents research contributions towards new techniques concepts analysis of the telecom market s evolving trends and infrastructure to provide integrated voice data and video communications services that are critical to the operation and competitiveness of companies governments and other organizations

Chaotic Signals in Digital Communications Marcio Eisencraft, Romis Attux, Ricardo Suyama, 2018-09-03 Chaotic Signals in Digital Communications combines fundamental background knowledge with state of the art methods for using chaotic signals and systems in digital communications The book builds a bridge between theoretical works and practical implementation to help researchers attain consistent performance in realistic environments It shows the possible shortcomings of the chaos based communication systems proposed in the literature particularly when they are subjected to non ideal conditions It also presents a toolbox of techniques for researchers working to actually implement such systems A Combination of Tutorials and In Depth Cutting Edge Research Featuring contributions by active leading researchers the book begins with an introduction to communication theory dynamical systems and chaotic communications suitable for those new to the field This lays a solid foundation for the more applied chapters that follow A Toolbox of Techniques Including New Ways to Tackle Channel Imperfections The book covers typical chaos communication methods namely chaotic masking chaotic modulation chaotic shift key and symbolic message bearing as well as bidirectional communication and secure communication It also presents novel methodologies to deal with communication channel imperfections These tackle band limited channel chaos communication radio channels with fading and the resistance of a special chaotic signal to multipath propagations In addition the book addresses topics related to engineering applications such as optical communications chaotic matched filters and circuit implementations and microwave frequency modulated differential chaos shift keying FM DCSK systems Insights for Both Theoretical and Experimental Researchers Combining theory and practice this book offers a unique perspective on chaotic communication in the context of non ideal conditions Written for theoretical and experimental researchers it tackles the practical issues faced in implementing chaos based signals and systems in digital communications applications

Applications of Chaos and Nonlinear Dynamics in Science and Engineering - Vol. 3 Santo Banerjee, Lamberto Rondoni, 2013-06-12 Chaos and nonlinear

dynamics initially developed as a new emergent field with its foundation in physics and applied mathematics. The highly generic interdisciplinary quality of the insights gained in the last few decades has spawned myriad applications in almost all branches of science and technology and even well beyond. Wherever quantitative modeling and analysis of complex nonlinear phenomena is required, chaos theory and its methods can play a key role. This third volume concentrates on reviewing further relevant contemporary applications of chaotic nonlinear systems as they apply to the various cutting edge branches of engineering. This encompasses but is not limited to topics such as fluctuation relations and chaotic dynamics in physics, fractals and their applications in epileptic seizures as well as chaos synchronization. Featuring contributions from active and leading research groups, this collection is ideal both as a reference and as a recipe book full of tried and tested successful engineering applications.

Chaotic Signal Processing Henry Leung, 2013-12-05

Chaos is a deterministic random phenomenon. Many signal processes e.g. radar and sonar have a random appearance and chaos provides an alternative approach to processing these signals. This book presents up to date research results on chaotic signal processing including the application of nonlinear dynamics to radar target recognition, an exactly solvable chaos approach for communications, a chaotic approach for reconfigurable computing, system identification using chaos, design of a high resolution LADAR system based on chaos and the use of chaos in compressive sensing.

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