



Digital communications using chaos and nonlinear dynamics

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Monografía

This book introduces readers to a new and exciting cross-disciplinary field of digital communications with chaos. This field was born around 15 years ago, when it was first demonstrated that nonlinear systems which produce complex non-periodic noise-like chaotic signals, can be synchronized and modulated to carry useful information. Thus, chaotic signals can be used instead of pseudo-random digital sequences for spread-spectrum and private communication applications. This deceptively simple idea spun hundreds of research papers, and many novel communication schemes based on chaotic signals have been proposed. However, only very recently researchers have begun to make a transition from academic studies toward practical implementation issues, and many "promising" schemes had to be discarded or re-formulated. This book describes the state of the art (both theoretical and experimental) of this novel field. The book is written by leading experts in the fields of Nonlinear Dynamics and Electrical Engineering who participated in US Army sponsored Multi-University Research Initiative on Digital Communication using Nonlinear Dynamics. It will be useful for active researchers and advanced graduate students interested in this exciting new field

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Contenido: An Overview of Digital Communications Techniques Using Chaos and Nonlinear Dynamics -- Digital Communication Using Self-Synchronizing Chaotic Pulse Position Modulation -- Spread Spectrum Communication with Chaotic Frequency Modulation -- Ultra-Wideband Communications Using Pseudo-Chaotic Time Hopping -- Optimum Spreading Sequences for Asynchronous CDMA System Based on Nonlinear Dynamical and Ergodic Theories -- Nonlinear Phenomena in Turbo Decoding Algorithms -- Security of Chaos-Based Communication and Encryption -- Random Finite Approximations of Chaotic Maps -- Numerical Methods for the Analysis of Dynamics and Synchronization of Stochastic Nonlinear Systems -- Dynamics and Synchronization of Semiconductor Lasers for Chaotic Optical Communications -- Performance of Synchronized Chaotic Optical Communication Systems

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