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| Collana | Lecture Notes in Electrical Engineering, , 1876-1119 ; ; 1235 |
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| Soggetti | Electrodynamics |
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| Nota di contenuto | Chapter 1 Algebraic principles to optimize operations in electrical systems -- Chapter 2 Power functional, its components and extremum -- Chapter 3 A method for accurately calculating circuits in a periodic state non-sinusoidal -- Chapter 4 Energy hysteresis loops in non-sinusoidal periodic state -- Chapter 5 Steiner optimal transformations of asymmetric elements in three-phase networks -- Chapter 6 Designing analog and digital filters -- Chapter 7 Fractals and their structures, measures and applications in circuits -- Chapter 8 Chaotic states in electric circuits -- Chapter 9 Electrochemical impedance spectroscopy -- Chapter 10 Circuits with special structures and their properties -- Chapter 11 Fractional Order Electric Circuits -- Chapter 12 Investigating Electrical Systems with Artificial Intelligence. |
| Sommario/riassunto | This book is addressed to researchers and practitioners in the theory and applications of electric circuits. It can also serve as a textbook for Ph.D. students examining applications of modern mathematics to important issues emerging nowadays more and more often in advanced electrical and electronic systems. The book offers effective tools to facilitate the study of all those circuits and systems increasingly |

penetrating our world, helping to discover their hidden beauty. The material is presented in twelve chapters divided into sections. Usually, first sections are of an introductory nature, explain studied phenomena and announce numerical results. More advanced investigations are presented in subsequent sections. The center of concern is set on existing modern methods as well as continuously emerging new methods of investigations useful for researchers, engineers and practitioners active in many interdisciplinary fields, where physics, electrochemistry, and electric circuits play a key role. Coverage includes: • Principles of optimal operations of electrical circuits; • The equilibrium state of the circuit as a stationary point of its power functional; • The Gibbs effect and its consequences for circuit analysis; • Accurate calculation of complex dynamic circuits operating in non-sinusoidal periodic states; • Energy hysteresis loops in non-sinusoidal periodic states of circuits; • Optimal transformations of elements in three-phase circuits; • Analog and digital filters; • Fractals and their structures and measures; • Fibonacci, Sierpiski and Cantor circuits; • Chaos in electrical circuits; •Electrochemical impedance spectroscopy; •Circuits with nanostructures and their properties; •Circuits of fractional orders; •AI in electrical circuits. This is the first extensive description of these topics and the interpretations of analytical results and those obtained from computer simulations with MATLAB environments. Special attention is paid to nonlinear electric circuits and finally the presentation is extended to effective applications of the achievements of modern AI. Numerous examples and exercises illustrate main results of the book. The book provides readers with a better understanding of origins and properties of many new circuit structures made possible by nanotechnology and atomic microscopy.