1. Record Nr. UNINA9910913794203321

Autore	Zheng Maosheng
Titolo	Systems Theory for Engineering Practice : Insights from Physics / / by Maosheng Zheng, Jie Yu
Pubbl/distr/stampa	Singapore : , : Springer Nature Singapore : , : Imprint : Springer, , 2024
ISBN	9789819793426 9819793424
Edizione	[1st ed. 2024.]
Descrizione fisica	1 online resource (162 pages)
Altri autori (Persone)	YuJie
Disciplina	003
Soggetti	System theory Control theory Dynamics Nonlinear theories Automatic control Mathematical physics Engineering mathematics Engineering - Data processing Systems Theory, Control Complex Systems Applied Dynamical Systems Control and Systems Theory Mathematical Methods in Physics Mathematical and Computational Engineering Applications
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Outline of systems theory -- Systems Theory in Classical Vibration and Wave -- Extreme Value Problems -- Characteristics of Electron in Atom, molecule and Metal -- Ising Model in Phase Transition, Elementary Excitation -- Brief Description of Probabilistic Multi-objective Optimization of A System -- Brief Description of Effective Media Approximation -- Certainty in uncertain phenomena -- General conclusions.

Sommario/riassunto

This book presents cognition of the universality of systems theory thinking by using some ordinary physical phenomena and their methods in study, of which the involved treatments are consistent with the viewpoint of systems theory. It contains the collective actions of classical vibration of many bodies and wave, the extreme value problem in natural world, status of electrons in atom-molecule and metals, Ising model in phase transition and elementary excitation in solid, multi-objective optimization in a system, description of effective media approximation, certainty in uncertain phenomena, all these reflect the cooperative/synergetic effects, wholeness of group actions, “unity of opposites” inside a system, and collective phenomena in a system completely. The relevant methodologies for systems theory are organic combination and synergism of both “reductionism” and “holism” instead of “confrontation” or “separation” of them, which could be used in dealing with analogous problems in systems science and engineering fields in response to the idiom of “stones from other hills being good for polishing this jade” and “comprehend by analogy”, so as to promote the transformation of wisdom to productivity. The authors wish this work could play its role as a paving stone to serve the research and application of systems theory. This book can be used as a textbook for postgraduate and advanced undergraduate students in relevant majors, and a reference book for scientists and practitioners in related fields.