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	Nota di contenuto	Chapter 1. Introduction to the bio-inspired X-structure/mechanism approach -- Chapter 2 The symmetric X-shaped structure -- Chapter 3 The horizontally-asymmetric X-shaped structure -- Chapter 4 The vertically-asymmetric X-shaped structure -- Chapter 5 Nonlinear dynamics in X-shaped structure -- Chapter 6 Multi-DoF-Multi-Joint leg-like structure -- Chapter 7 Nonlinear manipulation with X-mechanism -- Chapter 8 The adjustable X-mount -- Chapter 9 The nonlinear damping characteristics of the X-shaped structure -- Chapter 10 The adjustable and robust X-absorber -- Chapter 11 The X-shaped structure coupled with leverage I -- Chapter 12 The X-shaped structure coupled with leverage II -- Chapter 13 The human body inspired nonlinear inertia I -- Chapter 14 The human body inspired nonlinear inertia II -- Chapter 15 Nonlinear inertia coupling with X-mechanism: Modelling & Analysis -- Chapter 16 Nonlinear inertia coupling with X-mechanism: Prototyping & Testing -- Chapter 17 Stewart structure

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Sommario/riassunto

This book presents a unique approach to the design and analysis of beneficial nonlinearity, which can take an important and critical role in engineering systems and thus cannot be simply ignored in structural design, dynamic response analysis, and parameter selection. A key issue in the area is thus systematically addressed about how to analyze and design potential nonlinearities introduced to or inherent in a system of under study, which is a must-do task in many practical applications involving vibration control, energy harvesting, sensor systems and robots etc. This book, together with several other books in this book series, is to present an up-to-date summary on the most recent development of a cutting-edge method for nonlinearity manipulation and employment developed in recent several years, named as the X-shaped structure or mechanism approach. The X-shaped structure or mechanism is a generic structure or mechanism representing a class of beneficial geometric nonlinearity with realizable and flexible linkage mechanism or structural design of different variants or forms (quadrilateral, diamond, polygon, K/Z/S/V-shape, or others) which all share similar geometric nonlinearity and thus similar nonlinear stiffness/damping properties, flexible in design, and easy to implement. This book is particularly to present a systematic frequency domain analysis, design and optimization method of critical structural or control parameters in nonlinear systems including the X-structure/mechanism dynamics, aiming at better dynamic performance and special nonlinear response as expected in engineering practice. Cases studies in vehicle suspension, energy harvesting, fault detection and fuzzy membership optimization are all showcased. The new analysis and design method introduced in this book definitely present a totally new and powerful approach to optimization and understanding of a class of nonlinear systems from a special frequency domain point of view.