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Autore	Jing Xingjian
Titolo	The Bio-inspired X-Structure/Mechanism Approach for Exploring Nonlinear Benefits in Engineering : Part IV-Energy Harvesting and Sensors with X-Structures // by Xingjian Jing
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ISBN	9789819673483 9789819673476
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Descrizione fisica	1 online resource (427 pages)
Collana	Engineering Series
Disciplina	515.39
Soggetti	Dynamics Nonlinear theories Automatic control Robotics Automation Applied Dynamical Systems Control, Robotics, Automation
Lingua di pubblicazione	Inglese
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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.
Sommario/riassunto	This book introduces a novel approach to designing and analyzing beneficial nonlinearity, which plays a crucial role in engineering systems and cannot be overlooked in structural design, dynamic response analysis, and parameter selection. It systematically addresses the key issue of how to analyze and design potential nonlinearities, whether introduced or inherent in a system under study. This task is essential in many practical applications, including vibration control, energy harvesting, sensor systems, and robotics. The book provides an up-to-date summary of the latest developments in a cutting-edge method for manipulating and employing nonlinearity, known as the X-shaped structure or mechanism approach. Inspired by animal leg/limb skeletons, this method offers passive, low-cost, high-efficiency

adjustable beneficial nonlinear stiffness (high static & ultra-low dynamic), nonlinear damping (dependent on resonant frequency and vibration excitation amplitude), and nonlinear inertia (low static & high dynamic), either individually or simultaneously. The X-shaped structure or mechanism represents a class of beneficial geometric nonlinearity with flexible linkage mechanisms or structural designs in various forms (quadrilateral, diamond, polygon, K/Z/S/V-shape, or others). These forms share similar geometric nonlinearity and nonlinear stiffness/damping properties, making them flexible in design and easy to implement. The book series systematically review the research background, motivation, essential bio-inspired ideas, advantages of this novel method, beneficial nonlinear properties in stiffness, damping, and inertia, and potential applications developed since 2010, and particularly focuses in this book on innovative applications of the X-structure/mechanism method in energy harvesting and sensor systems.
