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2. Record Nr.	UNINA9910887805203321
Autore	Jing Xingjian
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Monografia

Nota di contenuto

Introduction to the bio inspired X structure mechanism approach --  
The symmetric X shaped structure -- The horizontally-asymmetric X  
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Nonlinear dynamics in X shaped structure.

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, therefore, presents 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 method is inspired from animal leg/limb skeletons and can provide passive low-cost high-efficiency adjustable and beneficial nonlinear stiffness (high static and ultra-low dynamic), nonlinear damping (dependent on resonant frequency and vibration excitation amplitude) and nonlinear inertia (low static and high dynamic) individually or simultaneously. 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 systematically reviews the research background, motivation, essential bio-inspired ideas, advantages of this novel method, beneficial nonlinear properties in stiffness, damping and inertia, and potential applications, which have been developed ever since 2010. This book reveals important nonlinear properties and dynamic characteristics of nonlinear inertia that can be provided through the X-structure/mechanism and also presents advantageous features of X-structure/mechanism methods in multi-direction vibration control.