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Engineering : Building Construction and Design

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Tensegrity Systems

- Addresses the design of tensegrity structures using analytical tools
- Discusses and integrates four major topics in a combined framework: structural design; control design; sensor/actuator placement; and sensor /actuator selection
- Discusses the rules for filling space (tesselation) with self-similar structures that guarantee a specific mechanical property (minimal mass subject to a specific strength and stiffness constraint)
- Discusses the applications of tensegrity systems: in Deployable solar arrays, large mirrors and antennas, wings without hinges, robotic systems without joints and string lightweight columns, walls, bridges, and buildings

Tensegrity Systems discusses analytical tools to design energy efficient and lightweight structures employing the concept of "tensegrity." This word is Buckminster Fuller's contraction of the words "Tensile" and "Integrity," which suggests that integrity or, as we would say, stability of the structure comes from tension. In a tensegrity structure the rigid bodies (the bars) might not have any contact, thus providing extraordinary freedom to control shape, by controlling only tendons. This book will provide both static and dynamic analysis of special tensegrity structural concepts, which are motivated by biological material architecture. This will be the first book written to attempt to integrate structure and control design. All other books on structure design and books on control design assume these are independent topics, but performance can be greatly improved if the dynamics of the structure and the dynamics of the controls are coordinated to reduce the control efforts required to accomplish the system performance requirements.

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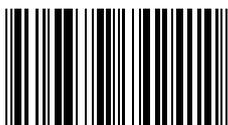
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