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Nota di contenuto	Emerging Actuator Technologies; Contents; Foreword; Preface; List of Figures; List of Tables; 1 Actuators in motion control systems: mechatronics; 1.1 What is an actuator?; 1.2 Transducing materials as a basis for actuator design; 1.2.1 Energy domains and transduction phenomena; 1.2.2 Transducer basics; 1.3 The role of the actuator in a control system: sensing, processing and acting; 1.3.1 Sensing; 1.3.2 Processing; 1.3.3 Actuation; 1.3.4 Impedance matching; 1.4 What is mechatronics? Principles and biomimesis; 1.4.1 Principles; 1.4.2 Mechatronics and biomimesis 1.5 Concomitant actuation and sensing: smart structures1.6 Figures of merit of actuator technologies; 1.6.1 Dynamic performance; 1.6.2 Actuator behavior upon scaling; 1.6.3 Suitability for the application; 1.6.4 Static performance; 1.6.5 Impact of environmental parameters; 1.7 A classification of actuator technologies; 1.7.1 Semiactive versus active actuators; 1.7.2 Translational versus rotational actuators; 1.7.3 Input energy domain; 1.7.4 Soft versus hard actuators; 1.8 Emerging

versus traditional actuator technologies; 1.9 Scope of the book: emerging actuators

1.10 Other actuator technologies

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2.5.1 Control circuits and resonant drivers

2.5.2 Control of nonresonant actuators; 2.6 Figures of merit of piezoelectric actuators; 2.6.1 Operational characteristics; 2.6.2 Scaling of piezoelectric actuators; 2.7 Applications; 2.7.1 Applications of resonant piezoelectric actuators; 2.7.2 Applications of nonresonant piezoelectric actuators; 3 Shape Memory Actuators (SMAs); 3.1 Shape memory alloys; 3.1.1 The shape memory effect; 3.1.2 Pseudoelasticity in SMAs; 3.2 Design of shape memory actuators; 3.2.1 Design concepts for actuation with SMAs; 3.2.2 Material considerations

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3.3 Control of SMAs; 3.3.1 Electrical heating; 3.3.2 Concomitant sensing and actuation with SMAs; 3.3.3 Integration in control loops; 3.4 Figures of merit of shape memory actuators; 3.4.1 Operational ranges; 3.4.2 Scaling laws for SMA actuators; 3.5 Applications; 4 Electroactive polymer actuators (EAPs); 4.1 Principles; 4.1.1 Wet EAP actuators; 4.1.2 Dry EAP actuators; 4.2 Design issues; 4.3 Control of EAPs; 4.4 Figures of merit of EAPs; 4.4.1 Operational characteristics; 4.4.2 Scaling laws for EAPs; 4.5 Applications; 5 Magnetostrictive actuators (MSs)

5.1 Principles of magnetostriction

Sommario/riassunto

Actuators are devices that convert electrical energy into mechanical work, traditionally used in electrical, pneumatic and hydraulic systems. As the demand for actuator technologies grows in biomedical, prosthetic and orthotic applications, there is an increasing need for complex and sophisticated products that perform efficiently also when scaled to micro and nano domains. Providing a comprehensive overview of actuators for novel applications, this excellent book:

- * Presents a mechatronic approach to the design, control and integration of a range of technologies covering piezoelectr