

1. Record Nr.	UNINA9910144585803321
Titolo	Adaptive structures [[electronic resource]] : engineering applications / / edited by David Wagg ... [et al.]
Pubbl/distr/stampa	Chichester, : John Wiley, c2007
ISBN	1-281-84035-1 9786611840358 0-470-51204-0 0-470-51206-7 1-60119-371-8
Descrizione fisica	1 online resource (315 p.)
Altri autori (Persone)	WaggDavid
Disciplina	624.1
Soggetti	Smart structures Smart materials Structural control (Engineering) Aerospace engineering Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Based on the 2006 Colston Research Society Symposium on Adaptive Structures, University of Bristol, July 10-12th 2006.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Adaptive Structures; Contents; List of Contributors; Preface; 1 Adaptive Structures for Structural Health Monitoring; 1.1 Introduction; 1.2 Structural Health Monitoring; 1.3 Impedance-Based Health Monitoring; 1.4 Local Computing; 1.5 Power Analysis; 1.6 Experimental Validation; 1.7 Harvesting, Storage and Power Management; 1.7.1 Thermal Electric Harvesting; 1.7.2 Vibration Harvesting with Piezoceramics; 1.8 Autonomous Self-healing; 1.9 The Way Forward: Autonomic Structural Systems for Threat Mitigation; 1.10 Summary; Acknowledgements; References; 2 Distributed Sensing for Active Control 2.1 Introduction 2.2 Description of Experimental Test Bed; 2.3 Disturbance Estimation; 2.3.1 Principal Component Analysis; 2.3.2 Application of PCA: Case Studies; 2.3.3 Combining Active Control and PCA to Identify Secondary Disturbances; 2.4 Sensor Selection; 2.4.1 Model Estimation; 2.4.2 Optimal Sensor Strategy; 2.4.3 Experimental

Demonstration; 2.5 Conclusions; Acknowledgments; References; 3 Global Vibration Control Through Local Feedback; 3.1 Introduction; 3.2 Centralised Control of Vibration; 3.3 Decentralised Control of Vibration 3.4 Control of Vibration on Structures with Distributed Excitation 3.5 Local Control in the Inner Ear; 3.6 Conclusions; Acknowledgements; References; 4 Lightweight Shape-Adaptable Airfoils: A New Challenge for an Old Dream; 4.1 Introduction; 4.2 Otto Lilienthal and the Flying Machine as a Shape-Adaptable Structural System; 4.3 Sir George Cayley and the Task Separation Principle; 4.4 Being Lightweight: A Crucial Requirement; 4.5 Coupling Mechanism and Structure: Compliant Systems as the Basis of Lightweight Shape-Adaptable Systems; 4.5.1 The Science of Compliant Systems 4.5.2 Compliant Systems for Airfoil Shape Adaptation 4.5.3 The Belt-Rib Airfoil Structure; 4.6 Extending Coupling to the Actuator System: Compliant Active Systems; 4.6.1 The Need for a Coupled Approach; 4.6.2 Solid-State Actuation for Solid-State Deformability; 4.6.3 Challenges and Trends of Structure-Actuator Integration; 4.7 A Powerful Distributed Actuator: Aerodynamics; 4.7.1 The Actuator Energy Balance; 4.7.2 Balancing Kinematics by Partially Recovering Energy from the Flow; 4.7.3 Active and Semi-Active Aeroelasticity; 4.8 The Common Denominator: Mechanical Coupling; 4.9 Concluding Remarks Acknowledgements References; 5 Adaptive Aeroelastic Structures; 5.1 Introduction; 5.2 Adaptive Internal Structures; 5.2.1 Moving Spars; 5.2.2 Rotating Spars; 5.3 Adaptive Stiffness Attachments; 5.4 Conclusions; 5.5 The Way Forward; Acknowledgements; References; 6 Adaptive Aerospace Structures with Smart Technologies - A Retrospective and Future View; 6.1 Introduction; 6.2 The Past Two Decades; 6.2.1 SHM; 6.2.2 Shape Control and Active Flow; 6.2.3 Damping of Vibration and Noise; 6.2.4 Smart Skins; 6.2.5 Systems; 6.3 Added Value to the System; 6.4 Potential for the Future 6.5 A Reflective Summary with Conclusions

---

## Sommario/riassunto

Adaptive structures have the ability to adapt, evolve or change their properties or behaviour in response to the environment around them. The analysis and design of adaptive structures requires a highly multi-disciplinary approach which includes elements of structures, materials, dynamics, control, design and inspiration taken from biological systems. Development of adaptive structures has been taking place in a wide range of industrial applications, but is particularly advanced in the aerospace and space technology sector with morphing wings, deployable space structures; piezoelectric device

---