

**INTELLIGENT STRUCTURAL SYSTEMS**

# SOLID MECHANICS AND ITS APPLICATIONS

Volume 13

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*Series Editor:* G.M.L. GLADWELL

*Solid Mechanics Division, Faculty of Engineering  
University of Waterloo  
Waterloo, Ontario, Canada N2L 3G1*

## *Aims and Scope of the Series*

The fundamental questions arising in mechanics are: *Why?*, *How?*, and *How much?* The aim of this series is to provide lucid accounts written by authoritative researchers giving vision and insight in answering these questions on the subject of mechanics as it relates to solids.

The scope of the series covers the entire spectrum of solid mechanics. Thus it includes the foundation of mechanics; variational formulations; computational mechanics; statics, kinematics and dynamics of rigid and elastic bodies; vibrations of solids and structures; dynamical systems and chaos; the theories of elasticity, plasticity and viscoelasticity; composite materials; rods, beams, shells and membranes; structural control and stability; soils, rocks and geomechanics; fracture; tribology; experimental mechanics; biomechanics and machine design.

The median level of presentation is the first year graduate student. Some texts are monographs defining the current state of the field; others are accessible to final year undergraduates; but essentially the emphasis is on readability and clarity.

*For a list of related mechanics titles, see final pages.*

# Intelligent Structural Systems

edited by

**H. S. TZOU**

*Department of Mechanical Engineering,  
University of Kentucky,  
Lexington, U.S.A.*

and

**G. L. ANDERSON**

*Engineering Science Division,  
U.S. Army Research Office,  
North Carolina, U.S.A.*



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# CONTENTS

- **EDITORS' PREFACE** vii
  
- **INTRODUCTION TO SMART STRUCTURES**  
G. L. Anderson, A. Crowson, and J. Chandra 1
  
- **ACTIVE PIEZOELECTRIC SHELL CONTINUA**  
H. S. Tzou 9
  
- **PIEZOELECTRIC LAMINATES: THEORY AND  
EXPERIMENT FOR DISTRIBUTED SENSORS AND  
ACTUATORS**  
C.-K. Lee 75
  
- **ACTIVE CONTROL OF NITINOL—REINFORCED COMPOSITE  
BEAM**  
A. Baz, S. Poh, J. Ro, M. Mutua, and J. Gilheany 169
  
- **ELECTRORHEOLOGICAL FLUIDS — MATERIALS AND  
APPLICATIONS**  
T. G. Duclos, J. D. Carlson, M. J. Chrzan, and J. P. Coulter 213
  
- **PIEZOELECTRIC WAFERS FOR REDUCING THE  
STRUCTURE VIBRATIONS**  
Ph. Destuynder, I. Legrain, L. Castel, and N. Richard 243
  
- **INTELLIGENT SENSOR SYSTEMS FOR UNDERWATER  
ACOUSTIC APPLICATIONS**  
T. R. Howarth, V. K. Varadan, and V. V. Varadan 285

- **DISTRIBUTED TRANSDUCER DESIGN FOR INTELLIGENT STRUCTURAL COMPONENTS**  
J. E. Hubbard, Jr. and S. E. Burke 305
- **OPTIMAL ACTUATOR PLACEMENT IN ADAPTIVE PRECISION TRUSSES**  
S. K. Das, S. Utku, G. S. Chen, and B. K. Wada 325
- **ACTIVE VIBRATION CONTROL OF AXIALLY MOVING CONTINUA**  
B. Yang and C. D. Mote, Jr. 359
- **MODEL REFINEMENT AND DAMAGE LOCATION FOR INTELLIGENT STRUCTURES**  
D. C. Zimmerman and S. W. Smith 403
- **SUBJECT INDEX** 453

## EDITORS' PREFACE

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In recent years, "*intelligent (smart) structures and systems*" has become an emerging new research area that is multi-disciplinary in nature, requiring technical expertise from mechanical engineering, structural engineering, electrical engineering, applied mechanics, engineering mathematics, material science, computer science, biological science, etc. This technology is quite likely to contribute significant advancements in the design of high-performance structures, adaptive structures, high-precision systems, micro-systems, etc. Although this emerging area has been rapidly gathering momentum in the last few years, researchers are aware that to some extent only initial, but highly feasible studies of the concepts proposed have been conducted. It is obvious that many important, pertinent fundamental research subjects must yet be investigated and resolved in the near future.

We have the privilege to invite a number of highly regarded research scientists and engineers to summarize and contribute the results of their years of research experience with the evolution of intelligent (smart) structures and systems to the collection of chapters contained in this book. Their research topics include current intelligent (smart) structures research activities, piezoelectric structures, shape memory alloy reinforced composites, applications of electrorheological fluids, intelligent sensor systems, adaptive precision trusses, damage detection, model refinement, control of axial moving continua, distributed transducers, etc. These subjects represent only a small portion of the complete picture; indeed, the fundamentally important development of smart or intelligent materials is not addressed in detail here. It is evident that we have made only a beginning and that much more remains to be accomplished in order to render that concept of an intelligent (smart) structure or system a practical reality.

We wish to express special words of gratitude to Dr. N. Hollingworth (the Acquisition Editor), Professor G.M.L. Gladwell (the Book Editor), and the entire technical staff at Kluwer Academic Publishers for their interest in and support for publishing this book.

**Editors:** **H. S. Tzou**, Department of Mechanical Engineering  
University of Kentucky, Lexington, Kentucky 40506-0046, U.S.A.

**G. L. Anderson**, Structural Mechanics Branch  
Engineering Sciences Division, U.S. Army Research Office  
Research Triangle Park, North Carolina 27709-2211, U.S.A.

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