Preface

Smart materials and structures is an area of technology which has been around for approximately 30 years or more where materials and structures are augmented by sensing and actuation functionality, and those functions are combined with control elements, all becoming an integral part of the materials and structures considered. With this, different areas in engineering have received significant inspiration such as with respect to loading or degradation of structures in the sense of structural health monitoring (SHM), optimised fluid-dynamic shaping in the sense of morphing as well as passive and active vibration damping, just to name a few. Structures (macro) as well as materials (micro) have been considered, drawing upon an understanding of materials and systems with sensing and actuation capabilities as well as control. This includes modelling, numerical simulation, realisation on a laboratory and finally also on a real application scale. The diversity of disciplines involved, comprising materials science and engineering, structural design, strength, dynamics and fatigue, control, electrical engineering, applied mathematics, signal processing, non-destructive testing, artificial intelligence and much more, makes up possibly one of the most interdisciplinary areas of engineering science history has ever seen. Even phenomena in biology are analysed and considered for inspiration towards applications in engineering.

Progress in material science has provided a comprehensive and theoretical framework for implementing multi-functionality into materials, and the development of high speed digital computation has allowed that framework to be gradually transformed into methodologies to be considered for practical design and production.

The ECCOMAS Thematic Conference on Smart Structures and Materials SMART2013 is the sixth in a series which started in 2001 and has progressed successfully over the years. Past conference venues were located in Portugal, Poland and Germany. SMART2013 will be the first occasion on which this conference will has been held in Italy.

This book collects Selected Plenary Lectures and Key-Note Lectures of the Conference.
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