Preface

Smart Materials and Structures have been around, within the research community, at least for the last three decades. The concept involves combined sensing, actuation and control capabilities embedded within materials and structures at different scales, from macro to micro scale. A variety of new research areas have emerged within smart technologies, with impacts in the wider fields of engineering and science, and more specifically in fields ranging from materials science to medicine. The disciplines involved in smart technologies make this field one of the most interdisciplinary areas of engineering science.

This book was compiled with expanded and reviewed contributions, originally presented at the 7th ECCOMAS Thematic Conference on Smart Structures and Materials (SMART2015), held at the University of the Azores, Ponta Delgada, S. Miguel Island, from 3 to 6 June 2015. The aim of this thematic conference series has been to gather the smart technologies community, providing a forum for the discussion of the current state of the art in the field and generating inspiration for future ideas on a multidisciplinary level.

Modeling aspects, design, fabrication and applications of smart materials and structures along with structural control and structural health monitoring with piezoelectric devices were the main topics of the conference. Application to morphing wings, aircraft and aerospace vehicles are increasing, along with the incorporation of nanotechnologies in smart materials and structures. In the field of modeling of smart structures, nonlinear aspects of material and structural response have now a noticeable expression, including some damage mechanics studies in smart structures and also modeling of electro-chemical and thermo-electromechanical behavior. On the other hand, contributions in biomedical engineering and biomimetic applications have started to bridge the gap between the smart technologies and the biomedical engineering communities.

We hope that the different articles in this book help providing an insight into the latest developments and future trends in smart structures and materials.

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