

# Preface

Over the last few years, the intense research activity at microscale and nanoscale reflected the need to account for disparate levels of uncertainty from various sources and across scales. As even over-refined deterministic approaches are not able to account for this issue, an efficient blending of stochastic and multiscale methodologies is required to provide a rational framework for the analysis and design of materials and structures. The purpose of the Symposium was to promote achievements in uncertainty quantification combined with multiscale modeling and to encourage research and development in this growing field with the aim of improving the safety and reliability of engineered materials and structures.

The Symposium took place from September 9 to September 11, 2013 in Santorini Island, Greece and has been attended by 39 participants from 12 countries. Special emphasis was placed on multiscale material modeling and simulation as well as on the multiscale analysis and uncertainty quantification of fracture mechanics of heterogeneous media. The homogenization of two-phase random media was also thoroughly examined in several presentations. Various topics of multiscale stochastic mechanics, such as identification of material models, scale coupling, modeling of random microstructures, analysis of CNT-reinforced composites and stochastic finite elements, have been analyzed and discussed. A large number of papers were finally devoted to innovative methods in stochastic dynamics.

This book consists of 20 chapters which are extended versions of selected papers presented at the Symposium. The chapters are grouped into the following five thematic topics: Damage and fracture, homogenization, inverse problems–identification, multi-scale stochastic mechanics and stochastic dynamics.

The editors would like to express their deep appreciation to all contributors for their active participation in the Symposium and for the time and effort devoted to the completion of their contributions to this volume. Special thanks are also due to the reviewers for their constructive comments and suggestions which enhanced the

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