

Preface

Structural nonlinear dynamics and diagnosis (*SNDD*) are of great concern to engineers, physicists, and mathematicians. They are multidisciplinary and encountered in many applications such as vibro-impact of mechanical structures, aeroelastic flutter, fatigue fracture, microelectromechanical systems, and energy harvesting systems. The aim of the two international conferences *CSNDD'2014* and *CSNDD'2014* held, respectively, in Marrakech (Morocco), April 30–May 2, 2012 and in Agadir (Morocco), May 21–23, 2014, is to provide a forum for the discussion of recent developments in the theory and industrial applications of structural nonlinear dynamics and diagnosis. This *SNDD* biannual conference offers a meeting place where scientists from different branches of applied mathematics, applied mechanics, and advanced physics working in nonlinear dynamics and control can meet to discuss the latest achievements and to exchange ideas in theoretical, numerical, and experimental advances in the field. Focuses are directed toward diverse topics, ranging from the theoretical of dynamical systems to different physical and engineering applications. The link between fundamental and applied nonlinear dynamics is one of the stimulating goals of the *SNDD* conference. A special effort has been to invite active researchers from engineering, science, and applied mathematics communities. These two technical meetings have indeed updated engineers with recent analytical developments of *SNDD* and at the same time allowed engineers and industrial practitioners to alert mathematicians with their unresolved issues.

This book presents the contributions of some distinguished participants in the two meetings. Both conferences were organized by the nonlinear dynamic group of the Hassan II University of Casablanca and have attracted representatives from the international scientific community in nonlinear dynamics, from more than 30 nationalities. There were more than 250 communications from scientists working in nonlinear dynamics from all over the world and more than 350 participants attended the meetings. The book addresses the state of the art and presents the most active current lines of research in the field of structural nonlinear dynamics. A wide audience of researchers in this field may have an advantage of the material

presented in this book. The book includes 22 chapters contributed by outstanding colleagues covering various aspects of applications grouped as follows:

- The first group comprises of six chapters related to structural health monitoring, diagnosis, damage detection, and energy harvesting.
- The second group consists of six chapters covering experimental methods, active vibration control, passive control of structures via nonlinear energy sinks, and microelectromechanical systems.
- The third group is comprised of ten chapters dealing with nonlinear dynamics, vibro-impact dynamics, and aeroelastic dynamics.

Researchers and engineers interested in challenges and opportunities posed by nonlinearities in the development of structural health monitoring, diagnosis and damage detection, control strategies, energy harvesting, novel design criteria, modeling, and characterization will find an outstanding introduction and useful resources of their current needs. We hope this book will provide valuable resources to graduate students involved in structural nonlinear dynamics and diagnosis.

The organizers of *CSNDD 2012* and *CSNDD 2014* would like to thank the generous contributions made by a number of individuals and institutions. In particular, the organizers would like to acknowledge the financial contributions of the University Hassan II-Casablanca, the University de Le Havre, University Mohamed I-Oujda, École Centrale de Lyon, ENSEM—Casablanca, the Academy Hassan II of Sciences and Techniques, CNRST, International Union of Mathematics, Polytechnic Institute of Casablanca, MANAGEM group, SOGELAB, and MASTE TEC.

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