

Preface

Nonlinear systems and methods for mechanical, electrical and other physical systems are present in this book along with nonlinear dynamics and mathematical methods. Also covered are the nonlinear phenomena in physical systems. The aims of this edited book are to show significant achievements in nonlinear science and complexity, including nonlinear dynamics, chaos, discontinuous systems, fractional dynamics, economical, social and biological systems, and so on.

Topics observed in this book are based on the those reported at the third Conference on nonlinear science and complexity (NSC), held in Ankara, Turkey from July 27–31, 2010. Due to the impact of topics on a very wide spectrum of problems in science and engineering, this conference provided a place to exchange recent developments, discoveries and progresses on *nonlinear science and complexity*. This conference is the continuation of the first 2006 Conference on *Nonlinear Science and Complexity*, held in Beijing, and the second 2008 conference on *Nonlinear Science and Complexity* held in Porto, Portugal. The aims of the selected papers are to present the fundamental and frontier theories and techniques for modern science and technology, and to stimulate more research interest for exploration of nonlinear science and complexity. The studies focus on fundamental theories and principles, analytical and symbolic approaches, computational techniques in nonlinear physical science and mathematics. After peer-reviews, only 20 chapters, which are divided into three parts, were selected for publication in this book.

- The first part consists of six chapters about nonlinear dynamical systems. It covers parametrical excited pendulum, nonlinear dynamics in hybrid systems, dynamical system synchronization and $(N+1)$ body dynamics. The new views different from the existing results in nonlinear dynamics will be presented in this section.
- The second part is concerned with mathematical methods for dynamical systems. The conservation laws and dynamical symmetry in nonlinear differential equation will be presented as well as the invex energies in Riemannian manifolds. In addition, other mathematical methods will be presented for nonlinear dynamical systems.

- The third group discusses the nonlinear phenomena in physical problems, such as solutions, complex flows, chemical kinetics, Toda lattices and parallel manipulator. All these results provide a wide view of nonlinear dynamics existing in real worlds.

The editors hope that this collection of chapters may be useful and fruitful for scholars, researchers and advanced technical members of industrial laboratory facilities, for developing new tools and products. The editors thank the Cankaya University and the Scientific and Technological Research Council of Turkey for the support needed to hold the discussions and debates and all colleagues for sharing their expertise and knowledge. for sharing their expertise and knowledge.

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