

Preface

This book is based on the conference on *Lie groups and computation methods in nonlinear problems of mathematical modeling*, Shenyang, Liaoning, China, July 27–August 5, 2015. This conference provided a place to exchange recent developments, discoveries, and progress on lie groups and computation methods in nonlinear problems of mathematical modeling. The aims of the conference were to present the fundamental and frontier theories and techniques for modern science and technology; to stimulate more research interest for exploration of nonlinear physical science and mathematical modeling; to directly pass the new knowledge to the young generation of engineers, including the developments, findings and progress on fundamental theories and principles, analytical and symbolic approaches, and computational techniques in nonlinear physical science and nonlinear mathematics.

Through this conference, a celebration of Prof. Valentin Afraimovich's 70th birthday was held. Special invited papers were extended to the book chapters. This book provides recent theoretical developments and new techniques to solve nonlinear dynamical systems, and hopes to help one understand complexity, stochasticity, and regularity in nonlinear dynamical systems. This book covers integro-differential equation solvability, Poincare recurrences in ergodic systems, orientable horseshoe structure, analytical routes of periodic motions to chaos, grazing on impulsive differential equations, from chaos to order in coupled oscillator and differential-invariant solutions for automorphic systems, and inequality under uncertainty. All the materials are placed into 12 book chapters. All the materials dedicated to Prof. Valentin Afraimovich are for his achievements and accomplishments on nonlinear dynamics and complexity. We hope the community of nonlinear dynamics will benefit from this edited book.

We would also like to express our gratitude to Shenyang Aerospace University which took care of all of the necessary arrangements for the conference and special events in China.

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