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Aims and Scope

Optimization has been expanding in all directions at an astonishing rate during the last few decades. New algorithmic and theoretical techniques have been developed, the diffusion into other disciplines has proceeded at a rapid pace, and our knowledge of all aspects of the field has grown even more profound. At the same time, one of the most striking trends in optimization is the constantly increasing emphasis on the interdisciplinary nature of the field. Optimization has been a basic tool in all areas of applied mathematics, engineering, medicine, economics, and other sciences.

The series *Springer Optimization and Its Applications* publishes undergraduate and graduate textbooks, monographs and state-of-the-art expository work that focus on algorithms for solving optimization problems and also study applications involving such problems. Some of the topics covered include nonlinear optimization (convex and nonconvex), network flow problems, stochastic optimization, optimal control, discrete optimization, multi-objective programming, description of software packages, approximation techniques and heuristic approaches.

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Editor

Applications of Mathematics and Informatics in Science and Engineering



Springer

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Preface

Mathematics has been vital to the development of civilization. From ancient to modern times mathematics has been fundamental to advances in science, engineering, and philosophy. Informatics, as an applied scientific area, represents a leading and broadly oriented base of technology, within key products of contemporary and future engineering trends in many scientific fields of knowledge, such as automation, machinery, computers, mechanics, robotics, telecommunications, electronic components, high tech, industrial science, and technical knowledge.

There is a major link between mathematics and informatics. These are disciplines with the same basic properties and interactions that positively affect the development of both disciplines. Thanks to informatics, mathematical approaches and mathematical methods established themselves in many other disciplines. The interdisciplinary applications of mathematics and informatics are the subject of the present book.

The applications presented here are sometimes difficult to classify mathematically, since tools from several areas of mathematics may be applied. We focus on these applications not by discussing the nature of their discipline but rather their interaction with mathematics.

The 26 papers of the book are independent of each other and they cover many scientific subjects. These are an outgrowth of the 2nd International Conference on Applications of Mathematics and Informatics in Military Sciences (2nd AMIMS), April 12–13, 2013. Hellenic Military Academy, and bring together a wide variety of mathematical methods with applications to science, engineering, and technology. Also studied is the theoretical background required for methods, algorithms, and techniques used in various applications as well as the direction of theoretical results in these applications. Open problems and future areas are also highlighted.

The book presents several results with an extensive discussion on applied operations research, scientific computing and applications, simulation of operations, logistics chain, game theory and allocation strategies, cryptology and computational number theory, security, wireless communications, statistical modeling and applications, invisibility regions and regular meta-materials, unmanned vehicles, modern radar techniques/SAR imaging, satellite remote sensing, coding, geospatial

problems, and robotic systems. Furthermore, this work will prove useful as a reference in the respective subjects and as a basis for further study and research.

The key features of the book are the following:

- Working groups meeting in composite sessions to address a wider spectrum of topics, which are of interest to their associated composite group.
- Developing courses of action or methodologies to reconcile issues identified.
- Cooperating prospects between various scientific and technology communities/converging a range of interdisciplinary objects with a large width of applications.

We hope that the book will be especially useful to graduate students and specialists in the interdisciplinary applications of mathematics and informatics, as well as to readers who are working in science and engineering.

Vari Attikis, Greece

Nicholas J. Daras

Foreword

Applications of Mathematics and Informatics in Science and Engineering includes both research and survey papers on applied operations research, scientific computing and applications, simulation of operations, logistics, game theory and allocation strategies, cryptology and computational number theory, security, wireless communications, statistical modeling and applications, invisibility regions and regular meta-materials, unmanned vehicles, modern radar techniques, satellite remote sensing, coding, geospatial problems, and robotic weapon systems.

The book will be especially useful to graduate students and specialists in the interdisciplinary applications of mathematics and informatics, as well as to all those who are interested in science and engineering.

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