

# Preface

This proceedings volume is an outcome of the 2nd Symposium on Applications of Mathematical Sciences held at the KIT Center MathSEE at Karlsruhe Institute of Technology (KIT), Germany, on September 27–29, 2023. The symposium featured eight plenary lectures and several contributed sessions on the applications of mathematical methods along the following tracks:

- Mathematical Structures: Shapes, Geometry, Number Theory and Algebra
- Mathematical Modeling, Differential Equations, Numerics and Simulation
- Inverse Problems and Optimization
- Stochastic Modeling, Statistical Data Analysis and Forecasting.

The symposium also included a panel discussion on the topic of “Interdisciplinary Mathematical Research: Challenges and Opportunities” followed by a symposium dinner for registered participants. On the first day of the symposium, a poster session took place with a competition for the “Best Poster Award”.

MathSEE (Mathematics in Sciences, Engineering, and Economics) is one of nine KIT centers, which are the largest organizational units of KIT combining central cross-divisional research activities and representing the strategic research fields. MathSEE views mathematical research as an indispensable component in research and progress in natural sciences, innovation, society, and for the economy. Its central mission is to foster interdisciplinary mathematical research. Scientists working in mathematical theory and in applications are cooperating in joint research projects. Ranging from young researchers to experienced mentors they are pooling their competencies and passion for mathematical research together in MathSEE. The center lives by the motto of playing a leading role in interdisciplinary mathematical research in sciences, engineering, and economics, and to enrich science, the economy, and society.

For the second time, MathSEE has held and sponsored the symposium so that attendance was free of charge. Thanks go to the scientific team consisting of Punit Gandhi, Martin Krejca, Annette Möller, Marc-Oliver Pohle, Bastian Rieck, Matthias Schlottbom, Bernadette Jana Stolz-Pretzer, and Alexandria Volkening for having designed the attractive program and selected the excellent speakers. Thanks also go

to the organizational team Sebastian Lerch, Andreas Ott, Julian Quinting, Björn de Rijk, Aarti Singh, John Alasdair Warwicker, and their numerous helpers for having made the symposium a unique and enjoyable event worth remembering

All participants of the symposium were offered to send in contributions to this proceedings volume. Following a thorough peer-review process, 14 contributions were finally accepted. The volume aims at all scientists interested in the interplay between mathematical methods and applications. The topics of the contributed papers reflect very well the unique spirit of the symposium and they may serve as an introductory guideline to the specific problems in the respective fields. We are very grateful to the referees for having carefully checked the papers and cordially thank them for their very valuable suggestions for improvement. We also thank all authors for having submitted their papers to this volume and thus sharing their latest research insights with a large community. Finally, our sincere thanks go to Springer for their support in compiling and publishing this volume.

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