

# EMS Press

## New Books 2024



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We have published over 260 books in mathematics since 2003, in both print and digital formats. Our books programme is mainly organised in series, including monographs, graduate texts, collected volumes, lecture notes as well as textbooks. Presented here are new additions to our programme in 2024.

### Differential-Algebraic Equations

Analysis and Numerical Solution  
Second Edition

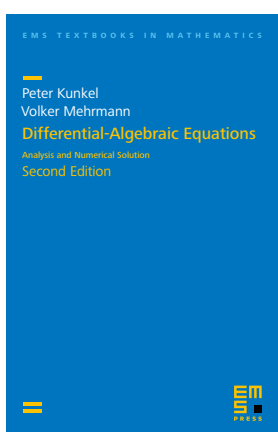
Peter Kunkel (Universität Leipzig) and  
Volker Mehrmann (Technische Universität Berlin)

*EMS Textbooks in Mathematics*

ISBN 978-3-98547-016-7 | 538 pp. | Hardcover | €79 | \$89

Differential-algebraic equations are a widely accepted tool for the modeling and simulation of constrained dynamical systems in numerous applications, such as mechanical multibody systems, electrical circuit simulation, chemical engineering, control theory, fluid dynamics and many other areas. In the second edition of this

textbook a systematic and detailed analysis of initial and boundary value problems for differential-algebraic equations is provided, addressing also their numerical solution. The large variety of the topics covered make this textbook an invaluable resource for both young and experienced researchers in applied mathematics.



### Profinite Groups and Residual Finiteness

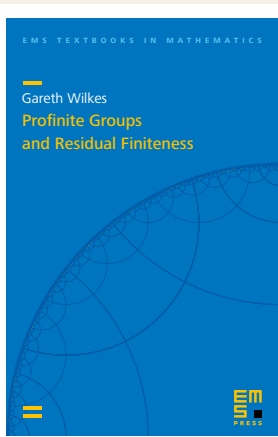
Gareth Wilkes (University of Cambridge)

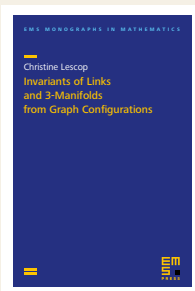
*EMS Textbooks in Mathematics*

ISBN 978-3-98547-078-5 | 434 pp. | Hardcover | €59 | \$65

This book describes the theory of profinite groups, from the basics to topics pertinent to current research. It is the first textbook on profinite groups to focus on their use in studying residually finite groups via their profinite completions. It begins with a firm theoretical underpinning from category theory and introduces profinite groups as worthy objects of study.

A standalone first course in group cohomology follows, before modifying this theory for use with profinite groups. Later chapters collect together for the first time key results on the relation between a group's cohomology and its profinite completion, and introduce the concept of a profinite group's action on a profinite tree.





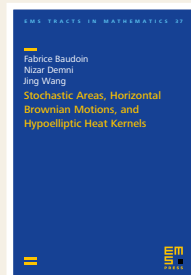
## Invariants of Links and 3-Manifolds from Graph Configurations

Christine Lescop (CNRS and Université Grenoble Alpes)

*EMS Monographs in Mathematics*

ISBN 978-3-98547-082-2 | 587 pp.  
Hardcover | €99 | \$109

This self-contained book explains how to count graph configurations to obtain topological invariants for 3-manifolds and links in these 3-manifolds, and it investigates the properties of the obtained invariants. The simplest of these invariants is the linking number of two disjoint knots in the ambient space described in the beginning of the book as the degree of a Gauss map. The book is written for graduate students and more advanced researchers interested in low-dimensional topology and knot theory.



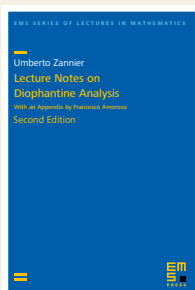
## Stochastic Areas, Horizontal Brownian Motions, and Hypoelliptic Heat Kernels

Fabrice Baudoin (Aarhus University), Nizar Demni (New York University Abu Dhabi), and Jing Wang (Purdue University)

*EMS Tracts in Mathematics*

ISBN 978-3-98547-079-2 | 352 pp.  
Hardcover | €69 | \$75

This book is a self-contained introduction to the theory of Brownian motions and heat kernels on matrix Lie groups and manifolds, with an emphasis on the study of area type functionals. It offers graduate students a systematic account of the subject and serves as a convenient resource and reference for more experienced mathematicians. The book emphasizes methods rather than results and takes the reader to the frontiers of current research, starting with carefully motivated examples and constructions. These aspects are supported by the inclusion of several bibliographic notes at the end of each chapter and appendices at the end of the book.



## Lecture Notes on Diophantine Analysis

With an Appendix by Francesco Amoroso  
Second Edition

Umberto Zannier (Scuola Normale Superiore, Pisa)

*EMS Series of Lectures in Mathematics*

ISBN 978-3-98547-077-8 | 411 pp.  
Softcover | €49 | \$55

The present book is a new, substantially enlarged, version of a previously published set of lecture notes on diophantine analysis. The content mixes a number of rather classical results on diophantine equations and diophantine approximation, with the basic theory of heights and a few more recent results and applications of it. The exposition has been generally kept at an elementary and essentially self-contained level, focusing on some main ideas rather than finer technical results which can be obtained by similar methods. The book is addressed also to readers outside the relevant fields as well as to more expert readers.



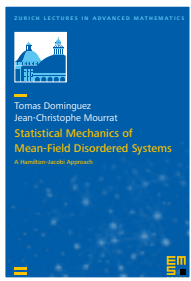
## Lectures on Random Matrices

Roland Speicher (Saarland University)

*EMS Series of Lectures in Mathematics*

ISBN 978-3-98547-075-4 | 131 pp.  
Softcover | €39 | \$42

This is an introduction to random matrix theory, giving an impression of some of the most important aspects of this modern subject. In particular, it covers the basic combinatorial and analytic theory around Wigner's semicircle law, featuring also concentration phenomena, and the Tracy–Widom distribution of the largest eigenvalue. The circular law and a discussion of Voiculescu's multivariate extension of the semicircle law, as an appetiser for free probability theory, also make an appearance.



## Statistical Mechanics of Mean-Field Disordered Systems

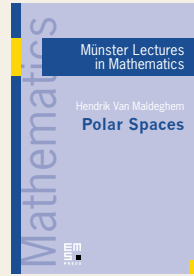
### A Hamilton-Jacobi Approach

Tomas Dominguez (University of Toronto) and Jean-Christophe Mourrat (École Normale Supérieure de Lyon)

*Zurich Lectures in Advanced Mathematics*

ISBN 978-3-98547-074-7 | 367 pp.  
Softcover | €59 | \$65

The goal of this book is to present new mathematical techniques for studying the behavior of mean-field systems with disordered interactions. The main focus is on certain problems of statistical inference in high dimension, and on spin glasses. The presented techniques aim to determine the free energy of these systems, in the limit of large system size, by showing that they asymptotically satisfy a Hamilton–Jacobi equation. The contents of the book are based on a lecture course given by the second-named author at the ETH Zürich in 2022.



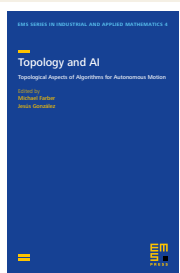
## Polar Spaces

Hendrik Van Maldeghem (Ghent University)

*Münster Lectures in Mathematics*

ISBN 978-3-98547-080-8 | 182 pp.  
Softcover | €49 | \$55

Polar spaces are the natural geometries for the classical groups. Due to the stunning simplicity of an axiom system found by Buekenhout and Shult, they play a central role in incidence geometry and also appear as combinatorial objects in many disciplines such as discrete mathematics, graph theory, finite geometry and coding theory. They can also be viewed as a class of spherical Tits buildings, and generally bridge the areas of group theory, algebra, combinatorics and incidence geometry. The present book is based on lecture notes from a master’s course in Ghent, Belgium, taught annually between 2010 and 2024.



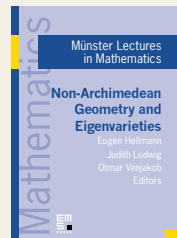
## Topology and AI

Edited by Michael Farber (Queen Mary University of London) and Jesús González (Center for Research and Advanced Studies of the National Polytechnic Institute Mexico City)

*EMS Series in Industrial and Applied Mathematics*

ISBN 978-3-98547-076-1 | 400 pp.  
Hardcover | €89 | \$99

The task of programming a machine to move autonomously and to make autonomous decisions is one of the major challenges of AI. The algorithms generating autonomous robot motions and autonomous decisions are sections of certain fibre bundles and their complexity and structure can be understood using tools of algebraic topology. The collection of survey articles gives an overview of the current achievements in the field of topological robotics concerned with motion algorithms, and in particular how their complexity depends on the topology of the configuration space of the system and the external conditions.



## Non-Archimedean Geometry and Eigenvarieties

Edited by Eugen Hellman (University of Münster), Judith Ludwig (Heidelberg University), and Otmar Venjakob (Heidelberg University)

*Münster Lectures in Mathematics*

ISBN 978-3-98547-581-0 | 317 pp.  
Softcover | €69 | \$75

This book offers an introduction to the theory of adic spaces, with applications to the geometry of automorphic forms. It is comprised of expanded lecture notes for six mini-courses delivered by the contributing authors at the Spring School on “Non-Archimedean Geometry and Eigenvarieties”, held in March 2023 at Heidelberg University. Designed for researchers and students with a background in algebraic geometry, this book serves as an accessible entry point into the theory.

# New from the *Memoirs of the European Mathematical Society* in 2024

## The Lévy Flight Foraging Hypothesis in Bounded Regions

### Subordinate Brownian Motions and High-risk/High-gain Strategies

Serena Dipierro (University of Western Australia), Giovanni Giacomini (University of Western Australia), and Enrico Valdinoci (University of Western Australia)

ISBN 978-3-98547-068-6 | 99 pp. | Softcover | €69 | \$75

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Bas Janssens (Delft University of Technology) and Karl-Hermann Neeb (Friedrich-Alexander University Erlangen-Nuremberg)

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Rufus Willett (University of Hawai'i at Mānoa) and Guoliang Yu (Texas A&M University)

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Assaf Naor (Princeton University)

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Nicolas Lerner (Institut de Mathématiques de Jussieu, Sorbonne Université)

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Ben Adcock (Simon Fraser University), Simone Brugiapaglia (Concordia University), Nick Dexter (Simon Fraser University), and Sebastian Moraga (Simon Fraser University)


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## Carathéodory Sets in the Plane

Joan Josep Carmona (Universitat Autònoma de Barcelona) and Konstantin Fedorovskiy (Lomonosov Moscow State University and St Petersburg University)

ISBN 978-3-98547-072-3 | 146 pp. | Softcover | €69 | \$75

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