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Alessio Figalli
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An Invitation to Optimal Transport, Wasserstein Distances, and Gradient Flows

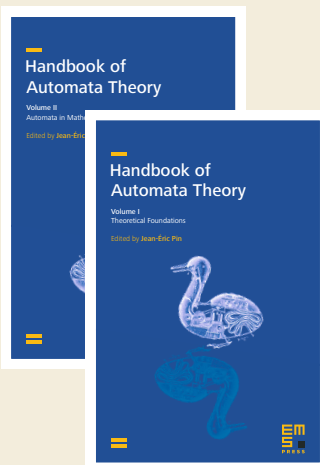## An Invitation to Optimal Transport, Wasserstein Distances, and Gradient Flows

Alessio Figalli (ETH Zürich) and Federico Glaudo (ETH Zürich)

EMS Textbooks in Mathematics

ISBN 978-3-98547-010-5 | 144 pp. | Hardcover | € 39 / $ 49

Coauthored by one of the leading experts in optimal transport, this book provides a self-contained introduction to this important topic presenting its essentials: Kantorovich duality, existence and uniqueness of optimal transport maps, Wasserstein distances, the JKO scheme, Otto's calculus, and Wasserstein gradient flows.

At the end, a presentation of some selected applications of optimal transport is given. The book is suitable for a course at the graduate level, and also includes an appendix with a series of exercises along with their solutions.

Handbook of
Automata Theory
Volume II
Automata in Math
Edited by Jean-Éric

Handbook of
Automata Theory
Volume I
Theoretical Foundations
Edited by Jean-Éric Pin

## Handbook of Automata Theory
Volume I. Theoretical Foundations
Volume II. Automata in Mathematics and Selected Applications

Jean-Éric Pin, ed. (Université de Paris and CNRS)

ISBN 978-3-98547-006-8 | Vol I. 896 pp. Vol II. 712 pp. | Hardcover | € 199 / $ 239 (both volumes)

Automata theory is a subject of study at the crossroads of mathematics, theoretical computer science, and applications, dealing with abstract models of systems whose behavior is based on transitions between states.

This important reference work on automata theory gives an authoritative and comprehensive overview of current research, and is aimed at a broad readership of researchers and graduate students in mathematics and computer science.
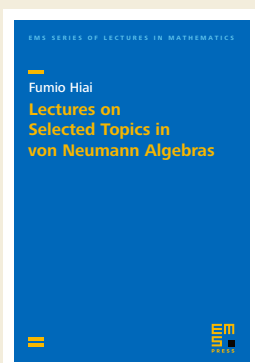
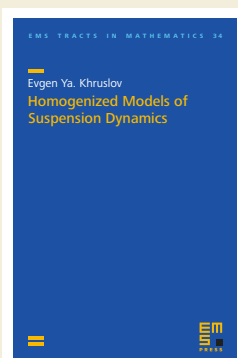## Lectures on Selected Topics in von Neumann Algebras

Fumio Hiai (Tohoku University)

EMS Series of Lectures in Mathematics

ISBN 978-3-98547-004-4 | 250 pp.
Softcover | €39/$49

The theory of von Neumann algebras, originating with the work of F. J. Murray and J. von Neumann in the late 1930s, has grown into a rich discipline with connections to different branches of mathematics and physics. These lecture notes aim to present a fast-track study of some important topics in classical parts of von Neumann algebra theory that were developed in the 1970s. The self-contained presentation of the material makes this book useful not only to graduate students and researchers interested in von Neumann algebras, but also to undergraduates with a basic knowledge of functional analysis and measure theory.

Orthogonal Polynomials and Linear Functionals
An Algebraic Approach and Applications

Juan García-Ardila (Universidad Politécnica de Madrid), Francisco Marcellán (Universidad Carlos III de Madrid), Misael E. Marriaga (Universidad Rey Juan Carlos)

EMS Series of Lectures in Mathematics

ISBN 978-3-98547-008-2 | 128 pp.
Softcover | €39/$49

This book presents an introduction to orthogonal polynomials, with an algebraic flavor, based on linear functionals defining the orthogonality and the Jacobi matrices associated with them. The book's structure reflects the fact that its content is based on a set of lectures delivered by one of the authors at the first Orthonet Summer School in Seville, Spain in 2016. The presentation of the material is self-contained and will be valuable to students and researchers interested in a novel approach to the study of orthogonal polynomials, focusing on their analytic properties.
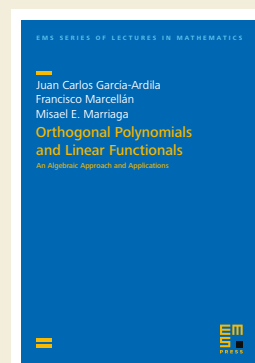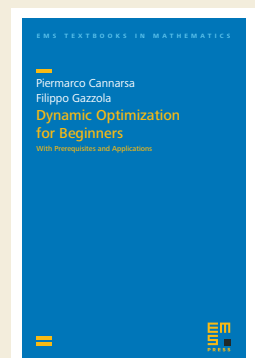
Homogenized Models of Suspension Dynamics

Evgen Ya. Khruslov (B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine)

EMS Tracts in Mathematics

ISBN 978-3-98547-009-9 | 288 pp.
Hardcover | €59/$65

This book studies the motion of suspensions, that is, of mixtures of a viscous incompressible fluid with small solid particles that can interact with each other through forces of non-hydrodynamic origin. Being one of the first mathematically rigorous treatises on suspensions from the viewpoint of homogenization theory, it will be useful to graduate students and researchers in applied analysis and partial differential equations as well as to physicists and engineers interested in the theory of complex fluids with microstructure.

Dynamic Optimization for Beginners
With Prerequisites and Applications

Piermarco Cannarsa (Università di Roma "Tor Vergata") and Filippo Gazzola (Politecnico di Milano)

EMS Textbooks in Mathematics

ISBN 978-3-98547-012-9 | 360 pp.
Hardcover | €49/$59

The main purpose of this book is to give interested readers a friendly introduction to optimization problems for dynamical systems, providing them with the essential notions needed to handle most of the concrete situations they will be faced with. The main topics covered are calculus of variations, optimal control theory, and dynamic programming, along with many examples and exercises. Its intended readership includes both mathematics students and students or researchers in other disciplines such as economics and data science.
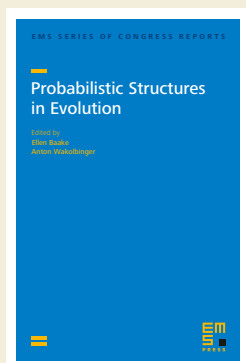
Probabilistic Structures in Evolution

Ellen Baake (Universität Bielefeld) and Anton Wakolbinger (Goethe-Universität Frankfurt a.M.), eds.

EMS Series of Congress Reports

ISBN 978-3-98547-005-1 | 502 pp.
Hardcover | €89/$99

Evolution is a complex phenomenon driven by various processes with intrinsically random elements which give rise to a wealth of phenomena that cannot be explained by deterministic models. The present volume collects twenty-one survey articles about probabilistic aspects of biological evolution, centred around the stochastic processes in population genetics and population dynamics. The contributions in this volume will be valuable to researchers interested in stochastic processes and their biological applications, or in mathematical population biology.
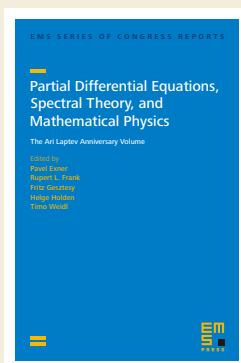
## Partial Differential Equations, Spectral Theory, and Mathematical Physics
The Ari Laptev Anniversary Volume

Pavel Exner (Czech Technical University and Czech Academy of Sciences) et al., eds.

EMS Series of Congress Reports

ISBN 978-3-98547-007-5 | 494 pp.
Hardcover | €89/$99

This volume is dedicated to Ari Laptev on the occasion of his 70th birthday. It collects original contributions by his numerous colleagues sharing with him research interests in analysis and spectral theory. Topics covered include, among others, functional and entropy inequalities, eigenvalue bounds and asymptotics, heat kernel estimates, Schrödinger operators, Feshbach–Schur maps, scattering theory, stability of matter, homogenization, Bose–Einstein condensation, Bogoliubov theory, Brezis–Nirenberg problems, electron density estimates etc.
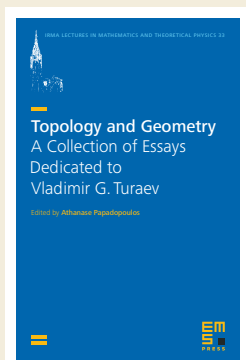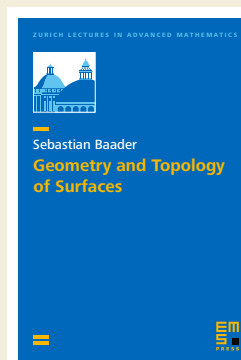
Topology and Geometry
A Collection of Essays Dedicated to Vladimir G. Turaev

Athanase Papadopoulos, ed. (Université de Strasbourg and CNRS)

IRMA Lectures in Mathematics and Theoretical Physics

ISBN 978-3-98547-001-3 | 698 pp.
Hardcover | €99/$119

Vladimir Turaev's numerous contributions are revisited and celebrated in this collected volume. The included essays cover the large spectrum of topics in which Turaev has been interested, including knot and link invariants, quantum representations, TQFTs, state sum constructions, geometric structures on knot complements, Kleinian groups, geometric group theory and its relationship with 3-manifolds, mapping class groups, operads, mathematical physics, Grothendieck's program, the philosophy of mathematics, and several other topics.

Geometry and Topology of Surfaces

Sebastian Baader (Universität Bern)

Zurich Lectures in Advanced Mathematics

ISBN 978-3-98547-000-6 | 86 pp.
Softcover | €29/$35

These lecture notes cover the classification of hyperbolic structures and measured foliations on surfaces in a minimalist way. While the inspiration is obviously taken from the excellent books *Primer on mapping class groups* and *Travaux de Thurston sur les surfaces*, the author aimed at including a little bit more of hyperbolic trigonometry, including a proof of Basmajian's identity on the orthogeodesic spectrum, while keeping the rest short.

Memoirs of the European Mathematical Society

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