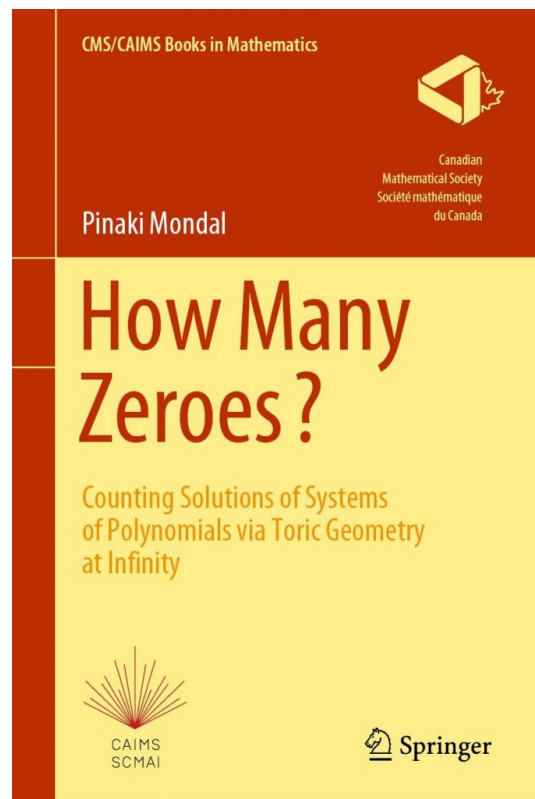


Karl Dilcher (Dalhousie University)

Since its inception in 2000 with Jon and Peter Borwein as first Editors-in-Chief, 45 titles were published in the book series “CMS Books in Mathematics” with Springer until 2021. That year, CAIMS/SCMAI (the Canadian Applied and Industrial Mathematics Society – Société Canadienne de Mathématiques Appliquées et Industrielles) joined forces with the CMS, and the book series was renamed “CMS/CAIMS Books in Mathematics”. The Editors-in-Chief for CAIMS are Frithjof Lutscher and Nilima Nigam, while Keith Taylor and Karl Dilcher have remained editors for the CMS.

Five volumes have so far been published in this new series; they are listed below, along with the publisher’s descriptions as printed on the back covers of the books. Full reviews will likely be published in later issues of the Notes. All titles are available as eBooks, as well as in softcover and hardcover editions. Information about prices, how to order, and how to submit a proposal for this book series can be found at <https://www.springer.com/series/16627>.

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How Many Zeroes?

Counting Solutions of Systems of Polynomials via Toric Geometry at Infinity

By Pinaki Mondal

Springer, 2021

ISBN: 978-3-031-10081-9

This graduate textbook presents an approach through toric geometry to the problem of estimating the isolated solutions (counted with appropriate multiplicity) of n polynomial equations in n variables over an algebraically closed field. The text collects and synthesizes a number of works on Bernstein's theorem of counting solutions of generic systems, ultimately presenting the theorem, commentary, and extensions in a comprehensive and coherent manner. It begins with Bernstein's original theorem expressing solutions of generic systems in terms of the mixed volume of their Newton polytopes, including complete proofs of its recent extension to affine space and some applications to open problems. The text also applies the developed techniques to derive and generalize Kushnirenko's results on Milnor numbers of hypersurface singularities, which has served as a precursor to the development of toric geometry. Ultimately, the book aims to present material in an elementary format, developing all necessary algebraic geometry to provide a truly accessible overview suitable to second-year graduate students.

Pinaki Mondal lives in Toronto and works in quantitative finance.

Non-Local Cell Adhesion Models

Symmetries and Bifurcations in 1-D
By Andreas Buttenschön and Thomas Hillen
Springer, 2021
ISBN: 978-3-030-67110-5

This monograph considers the mathematical modeling of cellular adhesion, a key interaction force in cell biology. While deeply grounded in the biological application of cell adhesion and tissue formation, this monograph focuses on the mathematical analysis of non-local adhesion models. The novel aspect is the non-local term (an integral operator), which accounts for forces generated by long ranged cell interactions. The analysis of non-local models has started only recently, and it has become a vibrant area of applied mathematics. This monograph contributes a systematic analysis of steady states and their bifurcation structure, combining global bifurcation results pioneered by Rabinowitz, equivariant bifurcation theory, and the symmetries of the non-local term. These methods allow readers to analyze and understand cell adhesion on a deep level.

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Andreas Buttenschön: Department of Mathematics, UBC Vancouver.
Thomas Hillen: Department of Mathematical and Statistical Science, University of Alberta.

A Primer of Subquasivariety Lattices

By Kira Adaricheva, Jennifer Hyndman, J. B. Nation, and Joy N. Nishida
Springer, 2022
ISBN: 978-3-030-98087-0

This book addresses Birkhoff and Mal'cev's problem of describing subquasivariety lattices. The text begins by developing the basics of atomic theories and implicational theories in languages that may, or may not, contain equality. Subquasivariety lattices are represented as lattices of closed algebraic subsets of a lattice with operators, which yields new restrictions on the equaclosure operator. As an application of this new approach, it is shown that completely distributive lattices with a dually compact least element are subquasivariety lattices. The book contains many examples to illustrate these principles, as well as open problems. Ultimately this new approach gives readers a set of tools to investigate classes of lattices that can be represented as subquasivariety lattices.

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Kira Adaricheva: Department of Mathematics, Hofstra University.
Jennifer Hyndman: Department of Mathematics and Statistics, UNBC, Prince George, BC.
J. B. Nation and Joy N. Nishida: Department of Mathematics, University of Hawaii at Manoa.

Numerical Methods for Solving Discrete Event Systems

With Applications to Queueing Systems
By Winfried Grassmann and Javad Tavakoli
Springer, 2022
ISBN: 978-3-031-10081-9

This graduate textbook provides an alternative to discrete event simulation. It describes how to formulate discrete event systems, how to convert them into Markov chains, and how to calculate their transient and equilibrium probabilities. The most appropriate methods for finding these probabilities are described in some detail, and templates for efficient algorithms are provided. These algorithms can be executed on any laptop, even in cases where the Markov chain has hundreds of thousands of states. This book features the probabilistic interpretation of Gaussian elimination, a concept that unifies many of the topics covered, such as embedded Markov chains and matrix analytic methods. The material provided should aid practitioners significantly to solve their problems. This book also provides an interesting approach to teaching courses of stochastic processes.

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Winfried Grassmann: Department of Computer Science, University of Saskatchewan.
Javad Tavakoli: Department of Mathematics, UBC Okanagan.

Numerical Analysis: A Graduate Course

By David A. Stewart
Springer, 2022
ISBN: 978-3-031-08120-0

This book aims to introduce graduate students to the many applications of numerical computation, explaining in detail both how and why the included methods work in practice. The text addresses numerical analysis as a middle ground between practice and theory, addressing both the abstract mathematical analysis and applied computation and programming models instrumental to the field. While the text uses pseudocode, Matlab and Julia codes are available online for students to use, and to demonstrate implementation techniques. The textbook also emphasizes multivariate problems alongside single-variable problems and deals with topics in randomness, including stochastic differential equations and randomized algorithms, and topics in optimization and approximation relevant to machine learning. Ultimately, it seeks to clarify issues in numerical analysis in the context of applications, and presenting accessible methods to students in mathematics and data science.

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