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KEY=TENSOR - LYDIA JAYVON

Continuum Mechanics

Springer Science & Business Media *This concise textbook develops step by step the fundamental principles of continuum mechanics. Emphasis is on mathematical clarity, and an extended appendix provides the required background knowledge in linear algebra and tensor calculus. After introducing the basic notions about general kinematics, balance equations, material objectivity and constitutive functions, the book turns to the presentation of rational thermodynamics by stressing the role of Lagrange multipliers in deriving constitutive functions from the underlying entropy principle. A brief lecture on extended thermodynamics closes the book. Many examples and exercises round off the material presendted in the chapters. The book addresses primarily advanced undergraduate students in theoretical physics, applied mathematics and materials sciences.*

Manifolds, Tensor Analysis, and Applications

Springer Science & Business Media *The purpose of this book is to provide core material in nonlinear analysis for mathematicians, physicists, engineers, and mathematical biologists. The main goal is to provide a working knowledge of manifolds, dynamical systems, tensors, and differential forms. Some applications to Hamiltonian mechanics, fluid me chanics, electromagnetism, plasma dynamics and control thcory arc given in Chapter 8, using both invariant and index notation. The current edition of the book does not deal with Riemannian geometry in much detail, and it does not treat Lie groups, principal bundles, or Morse theory. Some of this is planned for a subsequent edition. Meanwhile, the authors will make available to interested readers supplementary chapters on Lie Groups and Differential Topology and invite comments on the book's contents and development. Throughout the text supplementary topics are given, marked with the symbols ~ and {l:;J. This device enables the reader to skip various topics without disturbing the main flow of the text. Some of these provide additional background material intended for completeness, to minimize the necessity of consulting too many outside references. We treat finite and infinite-dimensional manifolds simultaneously. This is partly for efficiency of exposition. Without advanced applications, using manifolds of mappings, the study of infinite-dimensional manifolds can be hard to motivate.*

A Brief on Tensor Analysis

Springer Science & Business Media *In this text which gradually develops the tools for formulating and manipulating the field equations of Continuum Mechanics, the mathematics of tensor analysis is introduced in four, well-separated stages, and the physical interpretation and application of vectors and tensors are stressed throughout. This new edition contains more exercises. In addition, the author has appended a section on Differential Geometry.*

Tensor Analysis and Elementary Differential Geometry for Physicists and Engineers

Springer *This book presents tensors and differential geometry in a comprehensive and approachable manner, providing a bridge from the place where physics and engineering mathematics end, and the place where tensor analysis begins. Among the topics examined are tensor analysis, elementary differential geometry of moving surfaces, and k-differential forms. The book includes numerous examples with solutions and concrete calculations, which guide readers through these complex topics step by step. Mindful of the practical needs of engineers and physicists, book favors simplicity over a more rigorous, formal approach. The book shows readers how to work with tensors and differential geometry and how to apply them to modeling the physical and engineering world. The authors provide chapter-length treatment of topics at the intersection of advanced mathematics, and physics and engineering: • General Basis and Bra-Ket Notation • Tensor Analysis • Elementary Differential Geometry • Differential Forms • Applications of Tensors and Differential Geometry • Tensors and Bra-Ket Notation in Quantum Mechanics The text reviews methods and applications in computational fluid dynamics; continuum mechanics; electrodynamics in special relativity; cosmology in the Minkowski four-dimensional space time; and relativistic and non-relativistic quantum mechanics. Tensor Analysis and Elementary Differential Geometry for Physicists and Engineers benefits research scientists and practicing engineers in a variety of fields, who use tensor analysis and differential geometry in the context of applied physics, and electrical and mechanical engineering. It will also interest graduate students in applied physics and engineering.*

Tensor Network Contractions

Methods and Applications to Quantum Many-Body Systems

Springer Nature *Tensor network is a fundamental mathematical tool with a huge range of applications in physics, such as condensed matter physics, statistic physics, high energy physics, and quantum information sciences. This open access book aims to explain the tensor network contraction approaches in a systematic way, from the basic definitions to the important applications. This book is also useful to those who apply tensor networks in areas beyond physics, such as machine learning and the big-data analysis. Tensor network originates from the numerical renormalization group approach proposed by K.G. Wilson in 1975. Through a rapid development in the last two decades, tensor network has become a powerful numerical tool that can efficiently simulate a wide range of scientific problems, with particular success in quantum many-body physics. Varieties of tensor network algorithms have been proposed for different problems. However, the connections among different algorithms are not well discussed or reviewed. To fill this gap, this book explains the fundamental concepts and basic ideas that connect and/or unify different strategies of the tensor network contraction algorithms. In addition, some of the recent progresses in dealing with tensor decomposition techniques and quantum simulations are also represented in this book to help the readers to better understand tensor network. This open access book is intended for graduated students, but can also be used as a professional book for researchers in the related fields. To understand most of the contents in the book, only basic knowledge of quantum mechanics and linear algebra is required. In order to fully understand some advanced parts, the reader will need to be familiar with notion of condensed matter physics and quantum information, that however are not necessary to understand the main parts of the book. This book is a good source for non-specialists on quantum physics to understand tensor network algorithms and the related mathematics.*

Understanding Viscoelasticity

Basics of Rheology

Springer Science & Business Media *In this book, the necessary background for understanding viscoelasticity is covered; both the continuum and microstructure approaches to modelling viscoelastic materials are discussed, since neither approach alone is sufficient.*

From Vectors to Tensors

Springer Science & Business Media *This textbook deals with tensors that are treated as vectors. Coverage details such new tensor concepts as the rotation of tensors, the transposer tensor, the eigentensors, and the permutation tensor structure. The book covers an existing gap between the classic theory of tensors and the possibility of solving tensor problems with a computer. A complementary computer package, written in Mathematica, is available through the Internet.*

Encyclopaedia of Mathematics

Supplement Volume II

Springer Science & Business Media *This is the second supplementary volume to Kluwer's highly acclaimed eleven-volume Encyclopaedia of Mathematics. This additional volume contains nearly 500 new entries written by experts and covers developments and topics not included in the previous volumes. These entries are arranged alphabetically throughout and a detailed index is included. This supplementary volume enhances the existing eleven volumes, and together these twelve volumes represent the most authoritative, comprehensive and up-to-date Encyclopaedia of Mathematics available.*

Tensors for Physics

Springer *This book presents the science of tensors in a didactic way. The various types and ranks of tensors and the physical basis is presented. Cartesian Tensors are needed for the description of directional phenomena in many branches of physics and for the characterization the anisotropy of material properties. The first sections of the book provide an introduction to the vector and tensor algebra and analysis, with applications to physics, at undergraduate level. Second rank tensors, in particular their symmetries, are discussed in detail. Differentiation and integration of fields, including generalizations of the Stokes law and the Gauss theorem, are treated. The physics relevant for the applications in mechanics, quantum mechanics, electrodynamics and hydrodynamics is presented. The second part of the book is devoted to tensors of any rank, at graduate level. Special topics are irreducible, i.e. symmetric traceless tensors, isotropic tensors, multipole potential tensors, spin tensors, integration and spin-trace formulas, coupling of irreducible tensors, rotation of tensors. Constitutive laws for optical, elastic and viscous properties of anisotropic media are dealt with. The anisotropic media include crystals, liquid crystals and isotropic fluids, rendered anisotropic by external orienting fields. The dynamics of tensors deals with phenomena of current research. In the last section, the 3D Maxwell equations are reformulated in their 4D version, in accord with special relativity.*

Continuum Mechanics and Linear Elasticity

An Applied Mathematics Introduction

<u>Springer Nature</u> *This is an intermediate book for beginning postgraduate students and junior researchers, and offers up-to-date content on both continuum mechanics and elasticity. The material is self-contained and should provide readers sufficient working knowledge in both areas. Though the focus is primarily on vector and tensor calculus (the so-called coordinate-free approach), the more traditional index notation is used whenever it is deemed more sensible. With the increasing demand for continuum modeling in such diverse areas as mathematical biology and geology, it is imperative to have various approaches to continuum mechanics and elasticity. This book presents these subjects from an applied mathematics perspective. In particular, it extensively uses linear algebra and vector calculus to develop the fundamentals of both subjects in a way that requires minimal use of coordinates (so that beginning graduate students and junior researchers come to appreciate the power of the tensor notation).*

Geometry and Topology

Proceedings of the School Held at the Instituto de Matematica Pura e Aplicada CNPq, Rio de Janeiro, July 1976

<u>Springer</u> *III. Latin American School of Mathematics*

Tensor Algebra and Tensor Analysis for Engineers

With Applications to Continuum Mechanics

<u>Springer Science & Business Media</u> *There is a large gap between engineering courses in tensor algebra on one hand, and the treatment of linear transformations within classical linear algebra on the other. This book addresses primarily engineering students with some initial knowledge of matrix algebra. Thereby, mathematical formalism is applied as far as it is absolutely necessary. Numerous exercises provided in the book are accompanied by solutions enabling autonomous study. The last chapters deal with modern developments in the theory of isotropic and anisotropic tensor functions and their applications to continuum mechanics and might therefore be of high interest for PhD-students and scientists working in this area.*

Medical Image Computing and Computer Assisted Intervention – MICCAI 2018

21st International Conference, Granada, Spain, September 16-20, 2018, Proceedings

<u>Springer</u> *The four-volume set LNCS 11070, 11071, 11072, and 11073 constitutes the refereed proceedings of the 21st International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2018, held in Granada, Spain, in September 2018. The 373 revised full papers presented were carefully reviewed and selected from 1068 submissions in a double-blind review process. The papers have been organized in the following topical sections: Part I: Image Quality and Artefacts; Image Reconstruction Methods; Machine Learning in Medical Imaging; Statistical Analysis for Medical Imaging; Image Registration Methods. Part II: Optical and Histology Applications: Optical Imaging Applications; Histology Applications; Microscopy Applications; Optical Coherence Tomography and Other Optical Imaging Applications. Cardiac, Chest and Abdominal Applications: Cardiac Imaging Applications: Colorectal, Kidney and Liver Imaging Applications; Lung Imaging Applications; Breast Imaging Applications; Other Abdominal Applications. Part III: Diffusion Tensor Imaging and Functional MRI: Diffusion Tensor Imaging; Diffusion Weighted Imaging; Functional MRI; Human Connectome. Neuroimaging and Brain Segmentation Methods: Neuroimaging; Brain Segmentation Methods. Part IV: Computer Assisted Intervention: Image Guided Interventions and Surgery; Surgical Planning, Simulation and Work Flow Analysis; Visualization and Augmented Reality. Image Segmentation Methods: General Image Segmentation Methods, Measures and Applications; Multi-Organ Segmentation; Abdominal Segmentation Methods; Cardiac Segmentation Methods; Chest, Lung and Spine Segmentation; Other Segmentation Applications.*

Tensor Analysis for Engineers and Physicists - With Application to Continuum Mechanics, Turbulence, and Einstein's Special and General Theory of Relativity

Springer Nature

New Structures for Physics

Springer *This volume provides a series of tutorials on mathematical structures which recently have gained prominence in physics, ranging from quantum foundations, via quantum information, to quantum gravity. These include the theory of monoidal categories and corresponding graphical calculi, Girard's linear logic, Scott domains, lambda calculus and corresponding logics for typing, topos theory, and more general process structures. Most of these structures are very prominent in computer science; the chapters here are tailored towards an audience of physicists.*

Visualization and Processing of Tensor Fields

Advances and Perspectives

Springer Science & Business Media *This book provides researchers an inspirational look at how to process and visualize complicated 2D and 3D images known as tensor fields. With numerous color figures, it details both the underlying mathematics and the applications of tensor fields.*

Medical Image Computing and Computer-Assisted Intervention – MICCAI 2007

10th International Conference, Brisbane, Australia, October 29 - November 2, 2007, Proceedings, Part II

Springer *This title is part of a two-volume set that constitute the refereed proceedings of the 10th International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2007. Coverage in this second volume includes computer assisted intervention and robotics, visualization and interaction, neuroscience image computing, computational anatomy, innovative clinical and biological applications, general biological imaging computing, computational physiology.*

Hodge Cycles, Motives, and Shimura Varieties

Springer

Tensor Spaces and Numerical Tensor Calculus

Springer Nature *Special numerical techniques are already needed to deal with $n \times n$ matrices for large n. Tensor data are of size $n \times n \times...\times$ n=nd, where nd exceeds the computer memory by far. They appear for problems of high spatial dimensions. Since standard methods fail, a particular tensor calculus is needed to treat such problems. This monograph describes the methods by which tensors can be practically treated and shows how numerical operations can be performed. Applications include problems from quantum chemistry, approximation of multivariate functions, solution of partial differential equations, for example with stochastic coefficients, and more. In addition to containing corrections of the unavoidable misprints, this revised second edition includes new parts ranging from single additional statements to new subchapters. The book is mainly addressed to numerical mathematicians and researchers working with high-dimensional data. It also touches problems related to Geometric Algebra.*

From Vectors to Tensors

Springer Science & Business Media *This textbook deals with tensors that are treated as vectors. Coverage details such new tensor concepts as the rotation of tensors, the transposer tensor, the eigentensors, and the permutation tensor structure. The book covers an existing gap between the classic theory of tensors and the possibility of solving tensor problems with a computer. A complementary computer package, written in Mathematica, is available through the Internet.*

Lectures on Amenability

Springer *The notion of amenability has its origins in the beginnings of modern measure theory: Does a finitely additive set function exist which is invariant under a certain group action? Since the 1940s, amenability has become an important concept in abstract harmonic analysis (or rather, more generally, in the theory of semitopological semigroups). In 1972, B.E. Johnson showed that the amenability of a locally compact group G can be characterized in terms of the Hochschild cohomology of its group algebra L^1(G): this initiated the theory of amenable Banach algebras. Since then, amenability has penetrated other branches of mathematics, such as von Neumann algebras, operator spaces, and even differential geometry. Lectures on Amenability introduces second year graduate students to this fascinating area of modern mathematics and leads them to a level from where they can go on to read original papers on the subject. Numerous exercises are interspersed in the text.*

Principles of Computational Fluid Dynamics

Springer Science & Business Media *This up-to-date book gives an account of the present state of the art of numerical methods employed in computational fluid dynamics. The underlying numerical principles are treated in some detail, using elementary methods. The author gives many pointers to the current literature, facilitating further study. This book will become the standard reference for CFD for the next 20 years.*

Group Theory

Birdtracks, Lie's, and Exceptional Groups

Princeton University Press *Chapter 1. Introduction 1 Chapter 2. A preview 5 2.1 Basic concepts 5 2.2 First example: SU(n) 9 2.3 Second example: E6 family 12 Chapter 3. Invariants and reducibility 14 3.1 Preliminaries 14 3.2 Defining space, tensors, reps 18 3.3 Invariants 19 3.4 Invariance groups 22 3.5 Projection operators 24 3.6 Spectral decomposition 25 Chapter 4. Diagrammatic notation 27 4.1 Birdtracks 27 4.2 Clebsch-Gordan coefficients 29 4.3 Zero- and one-dimensional subspaces 32 4.4 Infinitesimal transformations 32 4.5 Lie algebra 36 4.6 Other forms of Lie algebra commutators 38 4.7 Classification of Lie algebras by their primitive invariants 38 4.8 Irrelevancy of clebsches 39 4.9 A brief history of birdtracks 40 Chapter 5. Recouplings 43 5.1 Couplings and recouplings 43 5.2 Wigner 3n-j coefficients 46 5.3 Wigner-Eckart theorem 47 Chapter 6. Permutations 50 6.1 Symmetrization 50 6.2 Antisymmetrization 52 6.3 Levi-Civita tensor 54 6.4 Determinants 56 6.5 Characteristic equations 58 6.6 Fully (anti)symmetric tensors 58 6.7 Identically vanishing tensors 59 Chapter 7. Casimir operators 61 7.1 Casimirs and Lie algebra 62 7.2 Independent casimirs 63 7.3 Adjoint rep casimirs 65 7.4 Casimir operators 66 7.5 Dynkin indices 67 7.6 Quadratic, cubic casimirs 70 7.7 Quartic casimirs 71 7.8 Sundry relations between quartic casimirs 73 7.9 Dynkin labels 76 Chapter 8. Group integrals 78 8.1 Group integrals for arbitrary reps 79 8.2 Characters 81 8.3 Examples of group integrals 82 Chapter 9. Unitary groups 84 P Cvitanovid, H. Elvang, and A.D. Kennedy 9.1 Two-index tensors 84 9.2 Three-index tensors 85 9.3 Young tableaux 86 9.4 Young projection operators 92 9.5 Reduction of tensor products 96 9.6 U(n) recoupling relations 100 9.7 U(n) 3n-j symbols 101 9.8 SU(n) and the adjoint rep 105 9.9 An application of the negative dimensionality theorem 107 9.10 SU(n) mixed two-index tensors 108 9.11 SU(n) mixed defining @ adjoint tensors 109 9.12 SU(n) two-index adjoint tensors 112 9.13 Casimirs for the fully symmetric reps of SU(n) 117 9.14 SU(n), U(n) equivalence in adjoint rep 118 9.15 Sources 119 Chapter 10. Orthogonal groups 121 10.1 Two-index tensors 122 10.2 Mixed adjoint 0 defining rep tensors 123 10.3 Two-index adjoint tensors 124 10.4 Three-index tensors 128 10.5 Gravity tensors 130 10.6 SO(n) Dynkin labels 133 Chapter 11. Spinors 135 P Cvitanovi6 and A.D. Kennedy 11.1 Spinography 136 11.2 Fierzing around 139 11.3 Fierz coefficients 143 11.4 6-j coefficients 144 11.5 Exemplary evaluations, continued 146 11.6 Invariance of y-matrices 147 11.7 Handedness 148 11.8 Kahane algorithm 149 Chapter 12. Symplectic groups 152 12.1 Two-index tensors 153 Chapter 13. Negative dimensions 155 P Cvitanovid and A.D. Kennedy 13.1 SU(n) = 3U(-n) 156 13.2 SO(n) = Yp(-n) 158 Chapter 14. Spinors' symplectic sisters 160 P Cvitanovid and A.D. Kennedy 14.1 Spinsters 160 14.2 Racah coefficients 165 14.3 Heisenberg algebras 166 Chapter 15. SU(n) family of invariance groups 168 15.1 Reps of SU(2) 168 15.2 SU(3) as invariance group of a cubic invariant 170 15.3 Levi-Civita tensors and SU(n) 173 15.4 SU(4)-SO(6) isomorphism 174 Chapter 16. G2 family of invariance groups 176 16.1 Jacobi relation 178 16.2 Alternativity and reduction of f-contractions 178 16.3 Primitivity implies alternativity 181 16.4 Casimirs for G2 183 16.5 Hurwitz's theorem 184 Chapter 17. E8 family of invariance groups 186 17.1 Two-index tensors 187 17.2 Decomposition of Sym3A 190 17.3 Diophantine conditions 192 17.4 Dynkin labels and Young tableaux for Fe 193 Chapter 18. E6 family of invariance groups 196 18.1 Reduction of two-index tensors 196 18.2 Mixed two-index tensors 198 18.3 Diophantine conditions and the Eý family 199 18.4 Three-index tensors 200 18.5 Defining 0 adjoint tensors 202 18.6 Two-index adjoint tensors 205 18.7 Dynkin labels and Young tableaux for 6 209 18.8 Casimirs for E6 210 18.9 Subgroups of EF 213 18.10 Springer relation 213 18.11 Springer's construction of 4 214 Chapter 19. F4 family of invariance groups 216 19.1 Two-index tensors 19.2 Defining 0 adjoint tensors 216 19.3 Jordan algebra and F4(26) 219 19.4 Dynkin labels and Young tableaux for F4 223 Chapter 20. E7 family and its negative-dimensional cousins 224 20.1 SO(4) family 20.2 Defining ® adjoint tensors 225 20.3 Lie algebra identification 227 20.4 E7 family 228 20.5 Dynkin labels and Young tableaux for E 233 Chapter 21. Exceptional magic 235 21.1 Magic Triangle 235 21.2 A brief history of exceptional magic 238 21.3 Extended supergravities and the Magic Triangle 238 Epilogue 242 Appendix A. Recursive decomposition 244 Appendix B. Properties of Young projections 246 H. Elvang and P Cvitanovid B.1 Uniqueness of Young projection operators B.2 Orthogonality 246 B.3 Normalization and completeness 247 B.4 Dimension formula 247 248.*

Mathematics for Machine Learning

<u>Cambridge University Press</u> *Distills key concepts from linear algebra, geometry, matrices, calculus, optimization, probability and statistics that are used in machine learning.*

Computer Applications for Handling Legal Evidence, Police Investigation and Case Argumentation

<u>Springer Science & Business Media</u> *This book provides an overview of computer techniques and tools — especially from artificial intelligence (AI) — for handling legal evidence, police intelligence, crime analysis or detection, and forensic testing, with a sustained discussion of methods for the modelling of reasoning and forming an opinion about the evidence, methods for the modelling of argumentation, and computational approaches to dealing with legal, or any, narratives. By the 2000s, the modelling of reasoning on legal evidence has emerged as a significant area within the well-established field of AI & Law. An overview such as this one has never been attempted before. It offers a panoramic view of topics, techniques and tools. It is more than a survey, as topic after topic, the reader can get a closer view of approaches and techniques. One aim is to introduce practitioners of AI to the modelling legal evidence. Another aim is to introduce legal professionals, as well as the more technically oriented among law enforcement professionals, or researchers in police science, to information technology resources from which their own respective field stands to benefit. Computer scientists must not blunder into design choices resulting in tools objectionable for legal professionals, so it is important to be aware of ongoing controversies. A survey is provided of argumentation tools or methods for reasoning about the evidence. Another class of tools considered here is intended to assist in organisational aspects of managing of the evidence. Moreover, tools appropriate for crime detection, intelligence, and investigation include tools based on link analysis and data mining. Concepts and techniques are introduced, along with case studies. So are areas in the forensic sciences. Special chapters are devoted to VIRTOPSY (a procedure for legal medicine) and FLINTS (a tool for the police). This is both an introductory book (possibly a textbook), and a reference for specialists from various quarters.*

Introduction to Tensor Analysis and the Calculus of Moving Surfaces

<u>Springer Science & Business Media</u> *This textbook is distinguished from other texts on the subject by the depth of the presentation and the discussion of the calculus of moving surfaces, which is an extension of tensor calculus to deforming manifolds. Designed for advanced undergraduate and graduate students, this text invites its audience to take a fresh look at previously learned material through the prism of tensor calculus. Once the framework is mastered, the student is introduced to new material which includes differential geometry on manifolds, shape optimization, boundary perturbation and dynamic fluid film equations. The language of tensors, originally championed by Einstein, is as fundamental as the languages of calculus and linear algebra and is one that every technical scientist ought to speak. The tensor technique, invented at the turn of the 20th century, is now considered classical. Yet, as the author shows, it remains remarkably vital and relevant. The author's skilled lecturing capabilities are evident by the inclusion of insightful examples and a plethora of exercises. A great deal of material is devoted to the geometric fundamentals, the mechanics of change of variables, the proper use of the tensor notation and the discussion of the interplay between algebra and geometry. The early chapters have many words and few equations. The definition of a tensor comes only in Chapter 6 – when the reader is ready for it. While this text maintains a consistent level of rigor, it takes great care to avoid formalizing the subject. The last part of the textbook is devoted to the Calculus of Moving Surfaces. It is the first textbook exposition of this important technique and is one of the gems of this text. A number of exciting applications of the calculus are presented including shape optimization, boundary perturbation of boundary value problems and dynamic fluid film equations developed by the author in recent years. Furthermore, the moving surfaces framework is used to offer new derivations of classical results such as the geodesic equation and the celebrated Gauss-Bonnet theorem.*

C^\infinity - Differentiable Spaces

<u>Springer</u> *The volume develops the foundations of differential geometry so as to include finite-dimensional spaces with singularities and nilpotent functions, at the same level as is standard in the elementary theory of schemes and analytic spaces. The theory of differentiable spaces is developed to the point of providing a handy tool including arbitrary base changes (hence fibred products, intersections and fibres of morphisms), infinitesimal neighbourhoods, sheaves of relative differentials, quotients by actions of compact Lie groups and a theory of sheaves of Fréchet modules paralleling the useful theory of quasi-coherent sheaves on schemes. These notes fit naturally in the theory of C^\infinity-rings and C^\infinity-schemes, as well as in the framework of Spallek's C^\infinity-standard differentiable spaces, and they require a certain familiarity with commutative algebra, sheaf theory, rings of differentiable functions and Fréchet spaces.*

Scientific and Technical Books and Serials in Print

Introduction to Smooth Manifolds

Springer Science & Business Media *Author has written several excellent Springer books.; This book is a sequel to Introduction to Topological Manifolds; Careful and illuminating explanations, excellent diagrams and exemplary motivation; Includes short preliminary sections before each section explaining what is ahead and why*

Regression Modeling Strategies

With Applications to Linear Models, Logistic Regression, and Survival Analysis

Springer Science & Business Media *Many texts are excellent sources of knowledge about individual statistical tools, but the art of data analysis is about choosing and using multiple tools. Instead of presenting isolated techniques, this text emphasizes problem solving strategies that address the many issues arising when developing multivariable models using real data and not standard textbook examples. It includes imputation methods for dealing with missing data effectively, methods for dealing with nonlinear relationships and for making the estimation of transformations a formal part of the modeling process, methods for dealing with "too many variables to analyze and not enough observations," and powerful model validation techniques based on the bootstrap. This text realistically deals with model uncertainty and its effects on inference to achieve "safe data mining".*

Leading Edge Computer Science Research

Nova Publishers *The books in this series present leading-edge research in the field of computer research, technology and applications. Each contribution has been carefully selected for inclusion based on the significance of the research to the field. Summaries of all chapters are gathered at the beginning of the book and an in-depth index is presented to facilitate access.*

Physics Briefs

Physikalische Berichte

Tensor Geometry

The Geometric Viewpoint and its Uses

Springer Science & Business Media *This treatment of differential geometry and the mathematics required for general relativity makes the subject accessible, for the first time, to anyone familiar with elementary calculus in one variable and with some knowledge of vector algebra. The emphasis throughout is on the geometry of the mathematics, which is greatly enhanced by the many illustrations presenting figures of three and more dimensions as closely as the book form will allow.*

Ecole d'Ete de Probabilites de Saint-Flour XV-XVII, 1985-87

Springer *This volume contains detailed, worked-out notes of six main courses given at the Saint-Flour Summer Schools from 1985 to 1987.*

Determinantal Rings

Springer *Determinantal rings and varieties have been a central topic of commutative algebra and algebraic geometry. Their study has attracted many prominent researchers and has motivated the creation of theories which may now be considered part of general commutative ring theory. The book gives a first coherent treatment of the structure of determinantal rings. The main approach is via the theory of algebras with straightening law. This approach suggest (and is simplified by) the simultaneous treatment of the Schubert subvarieties of Grassmannian. Other methods have not been neglected, however. Principal radical systems are discussed in detail, and one section is devoted to each of invariant and representation theory. While the book is primarily a research monograph, it serves also as a reference source and the reader requires only the basics of commutative algebra together with some supplementary material found in the appendix. The text may be useful for seminars following a course in commutative ring theory since a vast number of notions, results, and techniques can be illustrated significantly by applying them to determinantal rings.*

An Introduction to Manifolds

Springer Science & Business Media *Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way, the reader acquires the knowledge and skills necessary for further study of geometry and topology. The requisite point-set topology is included in an appendix of twenty pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems. This work may be used as the text for a one-semester graduate or advanced undergraduate course, as well as by students engaged in self-study. Requiring only minimal undergraduate prerequisites, 'Introduction to Manifolds' is also an excellent foundation for Springer's GTM 82, 'Differential Forms in Algebraic Topology'.*

Algebra

Springer Science & Business Media *This book is intended as a basic text for a one year course in algebra at the graduate level or as a useful reference for mathematicians and professionals who use higher-level algebra. This book successfully addresses all of the basic concepts of algebra. For the new edition, the author has added exercises and made numerous corrections to the text. From MathSciNet's review of the first edition: "The author has an impressive knack for presenting the important and interesting ideas of algebra in just the "right" way, and he never gets bogged down in the dry formalism which pervades some parts of algebra."*

Cybernetics, Cognition and Machine Learning Applications

Proceedings of ICCCMLA 2021

Springer Nature *This book includes the original, peer-reviewed research articles from the 3rd International Conference on Cybernetics, Cognition and Machine Learning Applications (ICCCMLA 2021), held in August 21 – 22, 2021, at Goa, India. It covers the latest research trends or developments in areas of data science, artificial intelligence, neural networks, cognitive science and machine learning applications, cyber physical systems and cybernetics.*

General Relativity for Mathematicians

Springer Science & Business Media *This is a book about physics, written for mathematicians. The readers we have in mind can be roughly described as those who: I. are mathematics graduate students with some knowledge of global differential geometry 2. have had the equivalent of freshman physics, and find popular accounts of astrophysics and cosmology interesting 3. appreciate mathematical elarity, but are willing to accept physical motiva tions for the mathematics in place of mathematical ones 4. are willing to spend time and effort mastering certain technical details, such as those in Section 1. 1. Each book disappoints so me readers. This one will disappoint: 1. physicists who want to use this book as a first course on differential geometry 2. mathematicians who think Lorentzian manifolds are wholly similar to Riemannian ones, or that, given a sufficiently good mathematical back ground, the essentials of a subject !ike cosmology can be learned without so me hard work on boring detaiis 3. those who believe vague philosophical arguments have more than historical and heuristic significance, that general relativity should somehow be "proved," or that axiomatization of this subject is useful 4. those who want an encyclopedic treatment (the books by Hawking-Ellis [1], Penrose [1], Weinberg [1], and Misner-Thorne-Wheeler [I] go further into the subject than we do; see also the survey article, Sachs-Wu [1]). 5. mathematicians who want to learn quantum physics or unified field theory (unfortunately, quantum physics texts all seem either to be for physicists, or merely concerned with formal mathematics).*

Commutative Algebra

with a View Toward Algebraic Geometry

Springer Science & Business Media *This is a comprehensive review of commutative algebra, from localization and primary decomposition through dimension theory, homological methods, free resolutions and duality, emphasizing the origins of the ideas and their connections with other parts of mathematics. The book gives a concise treatment of Grobner basis theory and the constructive methods in commutative algebra and algebraic geometry that flow from it. Many exercises included.*