
Book Reviews

Reviewed by Janez Grum

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- 1 Probability and Measure, Anniversary edition, Wiley series in probability and statistics, Established by W.A. Shewhart and S.S. Wilks by: P. Billingsley
Published 2012
by Wiley, John Wiley & Sons, Inc. Hoboken, New Jersey,
111 River Street, Hoboken, NJ 07030-5774, USA, 624pp
ISBN: 0-471-00710-2 (3rd ed.),
ISBN: 978-1-118-12237-2 (anniversary ed.)**

This Anniversary edition of probability and measure offers advanced students, scientists, and engineers an integrated introduction to measure theory and probability. Retaining intact the unique approach of the Third Edition, this text interweaves material on probability and measure, so that probability problems generate an interest in measure theory, which is then developed and applied to probability. Probability and measure provides thorough coverage of probability, measure, integration, random variables and expected values, convergence of distributions, derivatives and conditional probability, stochastic processes, Brownian motion, and ergodic theory. The Anniversary edition features a new, pedagogically sound interior design with an emphasis on open space.

The book contains following chapters:

- Chapter 1: Probability: Borel's normal number theorem, probability measures, existence and extension, denumerable probabilities, simple random variables, the law of large numbers, gambling systems, Markov chains, large deviations and the law of the iterated logarithm.
- Chapter 2: Measure: general measures, outer measure, measures in Euclidean space, measurable functions and mappings, distribution functions.
- Chapter 3: Integration: the integral, properties of the integral, the integral with respect to Lebesgue measure, product measure and Fubini's theorem, the L^p spaces.
- Chapter 4: Random variables and expected values: random variables and distributions, expected values, sums of independent random variables, the Poisson process, the ergodic theorem.
- Chapter 5: Convergence of distributions: weak convergence, characteristic functions, the central limit theorem, infinitely divisible distributions, limit theorems in R^k , the method of moments.

Chapter 6: Derivatives and conditional probability: derivatives on the line, the Radon-Nikodym theorem, conditional probability, conditional expectation, martingales.

Chapter 7: Stochastic processes: Kolmogorov's existence theorem, Brownian motion, non-denumerable probabilities.

Like the previous editions, this Anniversary edition will be well received by students of mathematics, statistics, economics, and a wide variety of disciplines that require a solid understanding of probability theory.

2 Parallel Processing for Scientific Computing

by: M.A. Heroux, P. Raghavan and H.D. Simon

Published 2006

by SIAM Society for industrial and applied mathematics,

3600 University City Science Center, Philadelphia,

PA 19104-2688, USA, 397pp

ISBN: 978-0-898716-19-1 (pbk.)

Scientific computing has often been called in the third approach to scientific discovery, emerging as a peer to experimentation and theory. Historically, the synergy between experimentation and experiments, experiments reinforce or invalidate theories, and so on. As scientific computing has evolved to produce results that meet or exceed the quality of experimental and theoretical results, it has become indispensable.

Parallel processing has been an enabling technology in scientific computing for more than 20 years. This book is the first in-depth discussion of parallel computing in 10 years; it reflects the mix of topics that mathematicians, computer scientists, and computational scientists focus on to make parallel processing effective for scientific problems. Presently, the impact of parallel processing on scientific computing varies greatly across disciplines, but it plays a vital role in most problem domains and is absolutely essential in many of them.

The book contains the following chapters:

Preface

Frontiers of scientific computing: an overview:

Performance modelling, analysis and optimisation

Performance analysis: From art to science, approaches to architecture-aware parallel scientific computation, achieving high performance on the BlueGene/L supercomputer, performance evaluation and modelling of ultra-scale systems.

Parallel algorithms and enabling technologies

Partitioning and load balancing for emerging parallel applications and architectures, combinatorial parallel and scientific computing, parallel adaptive mesh refinement, parallel sparse solvers, preconditioners, and their applications, a survey of parallelisation techniques for multigrid solvers, fault tolerance in large-scale scientific computing.

Tools and frameworks for parallel applications

Parallel tools and environments: A survey, parallel linear algebra software, high-performance component software systems, integrating component-based scientific computing software.

Applications of parallel computing

Parallel algorithms for PDE-constrained optimisation, massively parallel mixed-integer programming: Algorithms and applications, parallel methods and software for multicomponent simulations, parallel computational biology, opportunities and challenges for parallel computing in science and engineering.

This edited volume serves as an up-to-date reference for researchers and application developers on the state of the art in scientific computing. It also serves as an excellent overview and introduction, especially for graduate and senior-level undergraduate students interested in computational modelling and simulation and related computer science and applied mathematics aspects.

3 Systems Failure Analysis

by: J. Berk

Published 2009

by ASM International, Materials Park, Ohio 44073-0002, USA, 202pp

Library of Congress Control Number: 2009935432

ISBN-13: 978-1-61503-012-5, ISBN-10: 1-61503-012-3, SAN: 204-7586

This book covers component failure mechanisms, the focus on cause a system failure. System failures can be induced by component failures, or they can occur as a result of complex component and subsystem interactions.

The failure analysis process outlined in this book includes the following steps:

- designate a failure analysis team with representatives from engineering, quality assurance, manufacturing, purchasing, and field service
- gather all related failure information
- review the aforementioned information and define the problem
- identify all potential failure causes using
- list each potential failure cause in the failure mode assessment and assignment
- use appropriate documentation reviews, interviews, design analyses, hardware analyses, and designed experiments to converge on the root cause
- identify potential interim and long-term corrective actions, and select the most appropriate corrective actions
- ensure corrective actions are implemented in all relevant areas (suppliers, inventory, work in progress, repair centres, and fielded systems)

- follow-up after corrective actions have been implemented to assess corrective action efficacy
- evaluate other potential failure causes as corrective action candidates, incorporate preventive actions where it makes sense to do so
- incorporate failure analysis findings into a failure analysis library, design and process guidelines, and troubleshooting and repair documents.

The book discusses the following topic: systems failure analysis introduction, downsizing the hidden factory, systems and systems failure analysis concepts, identifying potential failure causes, fault-tree analysis special topics, fault-tree analysis quantification, failure mode assessment and assignment, pedigree analysis, change analysis, analytical equipment, mechanical and electronic failures, leaks, contaminants, design analysis, statistics and probability, design of experiments, corrective action, post-failure-analysis activities.

4 Wear Analysis for Engineers

by: R.G. Bayer

Published 2002

by HBN Publishing, 250 W. 87th St., #3FF,

New York, NY 10024, USA, 360pp

ISBN: 0-9664286-5-X

Like other types of analysis commonly used in engineering, wear analysis is fundamentally the use of equations and models to evaluate wear behaviour. However, for it to be effective, wear analysis must incorporate certain elements and considerations beyond the evaluation of equations. In this book author describes a wear analysis methodology that incorporates these elements and considerations. While wear behaviour is complex, useful wear analyses often are not. Generally, the complexity and rigor of the analysis depend primarily on the engineering needs and secondarily on the wear situation. Author's experience has been that simple and basic wear analyses, conducted in the proper manner, are often adequate in many engineering situations. Integral and fundamental to the wear analysis approach is the treatment of wear and wear behaviour as a system property. As a consequence wear analysis is not limited to the evaluation of the effects of materials on wear behaviour. Wear analysis often enables the identification of nonmaterial solutions or nonmaterial elements in a solution to wear problems. For example, changes in or recommendations for contact geometry, roughness, tolerance, and so on are often the results of a wear analysis.

The wear analysis process and the trends in tribological behaviour described in this book are based on experienced gathered over 40 years of utilising this method to resolve and avoid wear problems in a wide range of machines. Based on personal experience, this wear analysis method has been successfully applied to wear situations as diverse as those in modules containing computer chips to wear problems in engines and agricultural equipment. It has been used for devices sensitive to small amounts of wear but expected to withstand hundreds of millions of operations, as well as mechanisms less sensitive to wear or expected to withstand only a few hundred or so operations.

The book contains the following chapters:

- the wear analysis method: wear analysis overview, the wear analysis process, process implementation
- basic tribology: system concept, wear mechanisms, friction, lubrication, wear situations, design factors
- examination methods: tribosystems, wear, operating and design conditions, supplementary examinations and comparisons
- characterisation methods: operational classification, mechanistic classification
- phenomenological considerations: tribological trends, pivotal features, lubrication, materials, database use and testing, wear severity
- analytical methods: wear relationships, data analysis, alternative models
- special considerations: contact conditions, fluid lubrication, coatings and surface treatments, journal bearings, fretting, galling
- wear analysis examples: design triage for sliding wear, electro-erosion print head, fluid transfer system lugs, injection valve, disc drive bearing
- appendixes: equations for contact stress and area, nominal K -factors and friction coefficients, zero-wear factors and coefficients of friction for sliding, K -factors and P - V limits for plastics, galling threshold stress.

The wear analysis method is developed using numerous equations and is illustrated with more than 130 figures (including more than 80 micrographs). Its implementation is demonstrated with several detailed case studies and extensive compilations of wear data in dozens of tables and five appendixes. For situations where more detailed information is required, the discussion is supplemented with 220 references.

The book is an invaluable resource for practicing design and mechanical engineers, university-level courses in mechanical and materials engineering, tribologists, reliability engineers, and failure analysis engineers.

- 5 Magnesium Technology 2012, Proceedings of a Symposium Sponsored by the Magnesium Committee of the Light Metals Division of The Minerals, Metals & Materials Society (TMS), Held during TMS 2012 Annual Meeting & Exhibition, Orlando, Florida, USA, 11–15 March, 2012**
by: S.N. Mathaudhu, W.H. Sillekens, N.R. Neelameggham and N. Hort
Published 2012
by WILEY, John Wiley & Sons, Inc. Hoboken, New Jersey,
111 River Street, Hoboken, NJ 07030-5774, USA, 571pp
ISBN: 978-1-11829-121-4, ISSN Number 1545-4150

This book collects selected papers presented at the Symposium on Magnesium Technology organised in conjunction with the 2012 TMS Annual Meeting in Orlando, FL, USA.

To process minerals, metals and materials, it is always necessary to understand the chemistries, physical properties, forms, structures, occurrences, functions, relations, etc., of the associated materials prior, during, and after the processing of materials. This type of work, which is broadly understood as characterisation, is usually the first step taken to define and solve the industrial processing problems. Various characterisation technologies have been developed and applied to meet the needs. In many cases, characterisation has served as the brain for the processing of materials.

Conference proceeding includes the following main topics:

- plenary session
- primary production
- deformation mechanisms
- casting and solidification
- alloy and microstructural design
- corrosion and coating
- high temperature processing and properties
- processing-microstructure-property relationships
- advanced processing and joining
- processing-microstructure-property relationships
- energy and biomedical/primary production.

The proceedings are most useful for engines in practice, students, experts and researchers in the field for light metals.

6 How to Succeed as a Scientist, From Post Doc to Professor

by: B.J. Gabrys and J.A. Langdale

Published 2012

**by Cambridge University Press, The Edinburgh Building,
Cambridge CB2 8 RU, UK, 211pp**

ISBN: 978-0-521-76586-2 Hardback, ISBN: 978-0-521-18683 Paperback

This unique, practical guide for postdoctoral researchers and senior graduate students explains, stage by stage, how to gain the necessary research tools and working skills to build a career in academia and beyond. The book is based on a series of successful training workshops run by the authors, and is enriched by their extensive interdisciplinary experience as working scientists.

Discusses the tools needed to become an independent researcher, from writing papers and grant applications, to applying for jobs and research fellowships.

Introduces skills required as an academic, including managing and interacting with others, designing a taught course and giving a good lecture.

Concludes with a section on managing your career, explaining how to handle stress, approach new challenges and understand the higher education system.

Packed with helpful features encouraging readers to apply the theory to their individual situation, the book is also illustrated throughout with real-world case studies that enable readers to learn from the experiences of others. It is a vital handbook for all those wanting to pursue a successful academic career in the sciences.

7 Sustainable Electricity Supply with Low Environmental Impact

by: E. Jeffs, Green Energy

Published 2010

**by CRC Press, Taylor & Francis Group,
6000 Broken Sound Parkway NW, Suite 300,
Boca Raton, FL 33487-2742, USA, 228pp
ISBN: 978-1-4398-1892-3**

Green Energy: Sustainable Electricity Supply with Low Environmental Impact defines the future of the world's electricity supply system, exploring the key issues associated with global warming, and which energy systems are best suited to reducing it.

Electricity generation is a concentrated industry with a few sources of emissions, which can be controlled or legislated against. This book explains that a green sustainable electricity system is one whose construction, installation, and operation minimally affect the environment and produce power reliably at an affordable price. It addresses the question of how to build such an electricity supply system to meet the demands of a growing population without accelerating global warming or damaging the environment.

The green argument for conservation and renewable energies is a contradiction in terms. Although they produce no emissions, because renewable systems are composed of a large number of small units, a considerable amount of energy is required to produce, erect, and maintain them. This book is a response to that conundrum, answering key questions, such as:

- How can renewable be exploited to contribute the greatest energy input?
- Should coal be used for clean fuel and chemical production rather than for power generation?
- How quickly can we start to build the Green energy system?

The author has more than 40 years of experience as an international journalist reporting on power-generating technologies and on energy policies around the world. Detailing the developmental history and current state of the global nuclear industry, he discusses the dire immediate need for large quantities of clean, emission-free electric power for both domestic and industrial uses. This book details how current technologies-particularly nuclear, combined cycle, and hydro-can be applied to satisfy safely the growing energy demands in the future.

8 Advanced Polymer Nanoparticles, Synthesis and Surface Modifications**by: V. Mittal****Published 2011****by CRC Press, Taylor & Francis Group,
6000 Broken Sound Parkway NW, Suite 300,
Boca Raton, FL 33487-2742, USA, 372pp
ISBN: 978-1-4398-1443-7**

Polymer latex particles are a very important class of polymeric materials, which are used for a large number of commercial applications. These particles are synthesised in the aqueous dispersion phase by numerous synthesis methodologies such as emulsion, miniemulsion, microemulsion, dispersion, suspension, inverse emulsion (in organic phase), polymerisation, etc. over the years, significant enhancement in the techniques dealing with the synthesis and surface tailoring of polymer particles has been achieved, which has also resulted in the widening of the application spectrum of these particles. These advances include use of advanced controlled polymerisation means such as nitroxide-mediated polymerisation, atom transfer radical polymerisation, radical addition fragmentation transfer polymerisation, etc., as well as use of advanced stabilisers, surface modifiers, etc. These advances have made it possible to achieve polymer particles with specific sizes consisting of polymer chains of specific molecular weights and tailorable chemical compositions or properties according to the requirement.

The book contains the following chapters:

- polymer latex technology: an overview
- synthesis of polymer particles with core-shell morphologies
- advanced polymer nanoparticles with nonspherical morphologies
- block, graft, star, and gradient copolymer particles
- polymer nanoparticles by reversible addition-fragmentation chain transfer microemulsion polymerisation
- pH-responsive polymer nanoparticles
- smart thermo-responsive nanoparticles
- surface tailoring of polymer nanoparticles with living polymerisation methods
- effects of nano-sized polymerisation locus on the kinetics of controlled/living radical polymerisation
- functional polymer particles by emulsifier-free polymerisation
- polymer nanoparticles with surface active initiators and polymer initiators.

Because the advanced synthesis techniques are the key to achieve new functional properties in the polymer nanoparticles, and the surface modifications of these particles are required to ensure their use for specific applications, it is of immense importance to bring readers up-to-date on recent advances in these fields. This information will enable readers to design the required particle systems. This book thus serves the purpose of

summarising the developments in the synthesis and surface modification techniques to generate advanced polymer particles, and the contents have been accordingly organised.

9 Waves in Metamaterials

by: L. Solmar and E. Shamonina

Published 2011

**by OXFORD University press, Great Clarendon Street,
Oxford OX2 6DP, UK, 385pp**

ISBN: 978-0-19-921533-1

Metamaterials is a young subject born in the 21st century. It is concerned with artificial materials which can have electrical and magnetic properties difficult or impossible to find in nature. The building blocks in most cases are resonant elements much smaller than the wavelength of the electromagnetic wave. The book offers a comprehensive treatment of all aspects of research in this field at a level that should appeal to final year undergraduates in physics or in electrical and electronic engineering. The mathematics is kept at a minimum; the aim is to explain the physics in simple terms and enumerate the major advances. It can be profitably read by graduate and post-graduate students in order to find out what has been done in the field outside their speciality, and by experts who may gain new insight about the inter-relationship of the physical phenomena involved.

The book contains following chapters:

- basic concepts and basic equations
- a bird's-eye view of metamaterials
- plasmon-polaritons
- subwavelength imaging
- phenomena in waveguides
- magnetoinductive waves I
- magnetoinductive waves II
- seven topics in search of a chapter
- a historical review
- acronyms
- field at the centre of a cubical lattice, of identical dipoles
- derivation of material parameters from reflection and transmission coefficients
- how does surface charge appear in the boundary conditions
- the Brewster wave
- the electrostatic limit

- alternative derivation of the dispersion equation for SPPs for a dielectric-metal-dielectric structure: presence of a surface charge
- electric dipole moment induced by a magnetic field perpendicular to the plane of the SRR
- average dielectric constants of a multilayer structure
- derivation of mutual inductance between two magnetic dipoles in the presence of retardation.

10 Improving Energy Efficiency through Technology, Trends, Investment Behaviour and Policy Design

by: R.J.G.M. Florax, H.L.F. de Groot and P. Mulder

Published 2012

by Edward Elgar Publishing Limited, Cheltenham, UK,

William Pratt House, 9 Dewey Court, Northampton,

Massachusetts 01060, USA, 217pp

ISBN: 978-1-84542-390-2

This innovative book explores the adoption of energy-saving technologies and their impact on energy efficiency improvements. It contains a mix of theoretical and empirical contributions, and combines and compares economic and physical indicators to monitor and analyse trends in energy efficiency.

The authors pay considerable attention to empirical research on the determinants of energy-saving investment including uncertainty, energy-price volatility and subsidies. They also discuss the role of energy modelling in policy design and the potential effect of energy policies on technology diffusion in energy-extensive sectors.

The book contains the following chapters:

Introduction

- Energy efficiency and technological change.

Part I: Trends in energy efficiency

- a spatial perspective on global energy productivity trends
- energy-productivity performance across 14 OECD countries: the role of energy-extensive sectors
- using physical indicators to monitor energy efficiency in energy-extensive sectors
- monitoring energy use and energy efficiency in the Dutch service sector.

Part II: Technology and investment behaviour

- adoption criteria, diffusion and firm size: the role of learning in reconciling theories of endogenous technical change with empirical evidence
- a meta-regression analysis of the investment-uncertainty relationship

- the effects of uncertainty on investments: analysing the environmental impact of energy market liberalisation.

Part III: Energy policy design

- energy investment behaviour: firm heterogeneity and subsidy design
- effectiveness of energy policies in the service sector
- energy model and policy advice: the effect of model choice.

Epilogue

- conclusions and future research.

Written from a multi-disciplinary perspective, this book will appeal to academics and graduates in the areas of energy-saving technologies, energy economics and natural resource economics as well as policy-makers-particularly those in energy policy.