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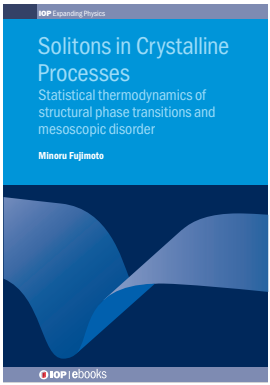


Extent 358pp

Collection
Expanding Physics

Subject
Condensed matter physics

ISBN 9780750315142 (electronic)

ISBN 9780750315128 (print)

Solitons in Crystalline Processes

Statistical thermodynamics of structural phase transitions and mesoscopic disorder

Minoru Fujimoto
University of Guelph, Canada

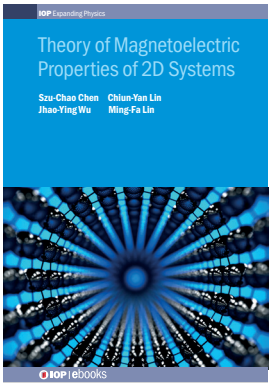
iopscience.org/book/978-0-7503-1514-2

About the book

Solitons in Crystalline Processes presents the soliton theory applied to crystalline processes for the first time. Starting with critical anomalies in binary transitions, the soliton idea leads to nonlinear waves in crystals, constituting the basic objective in this book. The theory explains logically not only structural transformations and mesoscopic disorder, but also the nonlinear mechanism of superconductivity with respect to the charge-current continuity substantiated by experimental studies; in contrast, for magnetic systems where solitons are relatively insignificant. Generally, solitons play the fundamental role in ordering processes in crystals, where the collective motion are essential for mesoscopic disorder in thermal equilibrium. This book is written as an introductory treatise with respect to the soliton concept, from structural transitions where the crystal symmetry changes, to magnets and superconductors, describing the role of nonlinear excitations in detail. Parts I and II introduce the theory and experimental techniques, while Part III discusses soliton theory of lattice dynamics in detail, and Part IV discusses the applications of this theory to superconductivity and magnetism. Exercises are given for each chapter to further develop understanding, and mathematics are limited to those needed to understand the theory.

About the author

Minoru Fujimoto is a retired professor of University of Guelph, Ontario, Canada. Engaged in experimental work on magnetic resonance on structural phase transitions, he has published a number of books including *Introduction to the Mathematical Physics of Nonlinear Waves* in 2014 with IOP Publishing.



Extent 118pp

Collection
Expanding Physics

Subject
Condensed matter physics

ISBN 9780750316743 (electronic)

ISBN 9780750316729 (print)

Theory of Magnetoelectric Properties of 2D Systems

Ming-Fa Lin, Szu-Chao Chen, Jhao-Ying Wu, and Chiun-Yan Lin
National Cheng Kung University

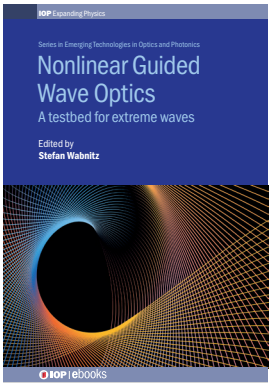
iopscience.org/book/978-0-7503-1674-3

About the book

This book addresses important advances in diverse quantization phenomena. *Theory of Magnetoelectric Properties of 2D Systems* develops the generalized tight-binding model in order to comprehend the rich quantization phenomena in 2D materials. The unusual effects, taken into consideration simultaneously, mainly come from the multi-orbital hybridization, the spin-orbital coupling, the intralayer and interlayer atomic interactions, the layer number, the stacking configuration, the site-energy difference, the magnetic field, and the electric field. The origins of the phenomena are discussed in depth, particularly focusing on graphene, tinene, phosphorene and MoS_2, with a broader model also drawn. This model could be further used to investigate electronic properties of 1D and 3D condensed-matter systems, and this book will prove to be a valuable resource to researchers and graduate students working in 2D materials science.

About the authors

Ming-Fa Lin, **Szu-Chao Chen**, **Jhao-Ying Wu** and **Chiun-Yan** Lin are all based at the National Cheng Kung University in Taiwan where they collaborate in theoretical solid state physics research and in particular properties of 2D materials.



Nonlinear Guided Wave Optics

A testbed for extreme waves

Edited by Stefan Wabnitz
Università di Brescia, Italy

iopscience.org/book/978-0-7503-1460-2

About the book

Experiments and theory have rapidly progressed on nonlinear optical extreme waves, showing that guided wave nonlinear optics and fiber lasers provide a relatively simple, accessible and controllable test bed for the observations and accurate statistical studies of extreme wave phenomena that obey the same universal rules, which apply to a large ensemble of different physical systems. With introductory material to make the subject area accessible to non-specialists such as graduate and PhD students, and researchers working in other areas where extreme waves are relevant, this book features contributions by prominent scientists in this emerging field and is a comprehensive treatment of optical extreme wave research.

About the editor

Stefan Wabnitz obtained the Laurea Degree in electronics engineering from the University of Rome "La Sapienza" in 1982, an MS in electrical engineering from Caltech in 1983, and a PhD in applied electromagnetism from the Italian Ministry of Education in 1988. In 1996, he became a full professor in physics at the University of Burgundy in Dijon, France. Since September 2007, he joined as a full professor of the Department of Electronics for Automation of the University of Brescia, Italy. His current research activities involve nonlinear propagation effects in high-bit-rate optical communication systems and in all-optical information processing devices. He is the author and co-author of more than 500 refereed papers and conference presentations, the deputy editor of Elsevier's *Optical Fiber Technology*, and is a member of the Optical Society of America, and of the IEEE-Photonics Society.

Extent 378pp

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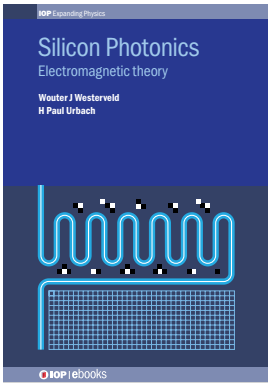

Extent 156pp

Collection
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Subject
Optics and photonics

ISBN 9780750313865 (electronic)

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Silicon Photonics

Electromagnetic theory

Wouter J Westerveld and H Paul Urbach
Delft University of Technology, the Netherlands

iopscience.org/book/978-0-7503-1386-5

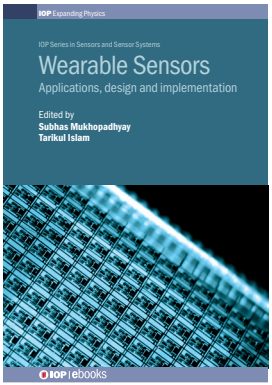
About the book

Silicon Photonics: Electromagnetic theory is a concise introduction to the fundamental theories of integrated optics that focuses on modern silicon photonic technology. It includes well-known general theories on properties of waveguides and couplers as well as new theories on high-index contrast waveguides, directional couplers, and micro-ring resonators. The book may be used as a first introduction to integrated optics, with only basic electrodynamics as prerequisite. It would fit well as lecture material in a short introduction course, as additional material in an extensive electrodynamics course, or as fundamental background material in a more applied course. The later chapters are of interest to experts in the field of integrated optics that want to learn the latest theories for high-index contrast waveguides such as silicon photonic waveguides.

About the authors

Wouter J Westerveld received his MSc in applied physics and PhD from Delft University of Technology, the Netherlands in 2014. He has worked in the fields of sound control, ultrasonic imaging, silicon integrated photonics, and silicon integrated opto-mechanical sensors to sense strain and ultrasound. His research interest is in applied physics with special interest in photonics, acoustics and microsystems.

Paul Urbach graduated from the University of Groningen in the Netherlands, and completed his PhD thesis at the same university on the optimization of hydrodynamic propulsion. In 1986, he joined Philips Research Laboratory in Eindhoven, the Netherlands and in 1994 he became principal scientist. Since January 2008 he has been full professor and head of the Optics Research Group of TUDelft.



Wearable Sensors

Applications, design and implementation

Edited by

[1]Subhas Mukhopadhyay

[2]Tarikul Islam

[1]Macquarie University, Sydney, Australia

[2]Jamia Millia Islamia, New Delhi, India

iopscience.org/book/978-0-7503-1505-0

About the book

With the ability to monitor a vast range of physiological parameters, combined with wireless technology, wireless sensor networks and the Internet of Things, wearable sensors are revolutionising the field of digital health monitoring. In addition to applications in health monitoring, such technology is being used to monitor the state of our living environment and even the quality of our foods and the wellbeing of livestock. Written for scientists, engineers and practitioners by an international collection of authors, this book reviews the fundamentals of wearable sensors, their function, design, fabrication and implementation. Their application and advanced aspects including interface electronics and signal processing for easy interpretation of data, data transmission, data networking, data security, and privacy are also included.

About the editors

Subhas Mukhopadhyay is professor of Mechanical and Electronics Engineering at Macquarie University, New South Wales, Australia, with a research interest in applications of sensors, sensor technology and networks, especially in the area of health care.

Tarikul Islam has many years of teaching and research experience, specialising in instrumentation and measurement, sensors arrays and signal processing.

Extent 350pp

Collection
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Sensors and Instrumentation

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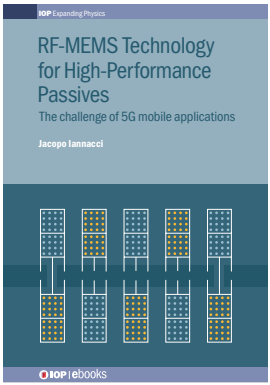
ISBN 9780750315036 (print)



RF-MEMS Technology for High-Performance Passives

The challenge of 5G mobile applications

Jacopo Iannacci
Center for Materials and Microsystems, Fondazione Bruno Kessler, Trento, Italy

iopscience.org/book/978-0-7503-1545-6

Extent 164pp

Collection
Expanding Physics

Subject
Applied and industrial physics

ISBN 9780750315456 (electronic)

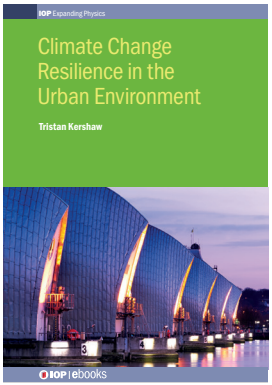
ISBN 9780750315432 (print)

About the book

This book outlines the intrinsic potential of RF-MEMS technology with specific focus on 5G mobile communications and services. Commencing with a review of the characteristics of RF-MEMS in relation to the specifications of interest for 5G, the book proceeds to develop practical insight concerning the design and development of RF-MEMS including case studies of design concepts. Including multiphysics simulation and animations, the book will be essential reading for both academic and industrial researchers and engineers.

About the author

Jacopo Iannacci is Researcher in MEMS technology with the Center for Materials and Microsystems (CMM) at Fondazione Bruno Kessler (FBK) in Trento, Italy, since 2007. His scientific focuses are on (compact) modelling, design, optimisation, integration, packaging and testing for reliability of RF-MEMS (Radio Frequency MicroElectroMechanical Systems) passive devices/networks, EH-MEMS (Energy Harvesting MEMS), as well as SA-MEMS (MEMS Sensors and Actuators). He has authored and co-authored numerous scientific contributions for international journals and conference proceedings, as well as books and several book chapters in the field of MEMS and RF-MEMS technology.



Climate Change Resilience in the Urban Environment

Tristan Kershaw
University of Bath, UK

iopscience.org/book/978-0-7503-1197-7

About the book

Between 1930 and 2030, the world's population will have flipped from 70% rural to 70% urban. While much has been written about the impacts of climate change and mitigation of its effects on individual buildings or infrastructure, this book is one of the first to focus on the resilience of whole cities. It covers a broad range of area-wide disaster-level impacts, including drought, heatwaves, flooding, storms and air quality, which many of our cities are ill-adapted to cope with, and unless we can increase the resilience of our urban areas then much of our current building stock may become uninhabitable. *Climate Change Resilience in the Urban Environment* provides a detailed overview of the risks for urban areas, including those risks to human health as well as to building integrity, the physical processes involved, and presents key information in which way the risks can be reduced and urban areas made more resilient.

About the author

Tristan Kershaw is a building physicist whose research focuses on the effects of climate change on the built environment, the origin and manipulation of the heat island effect, and increasing resilience of the built environment to climate change. He received the CIBSE Napier Shaw Medal in 2012 for his part in the creation of probabilistic future weather years using the outputs of UKCP09 as part of the EPSRC-funded PROMETHEUS project.

Extent 300pp

Collection
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Environmental physics and green energy

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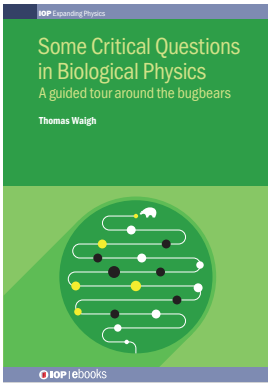


Some Critical Questions in Biological Physics

A guided tour around the bugbears

Thomas Waigh
University of Manchester, UK

iopscience.org/book/978-0-7503-1374-2

Extent 202pp

Collection
Expanding Physics

Subject
Biophysics

ISBN 9780750313742 (electronic)

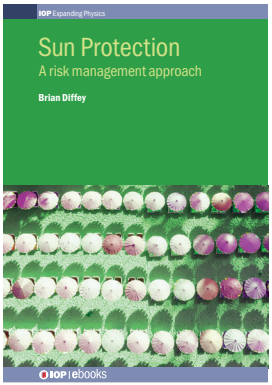
ISBN 9780750313759 (print)

About the book

Some Critical Questions in Biological Physics discusses 18 key questions in biological physics, each forming independent chapters that will, by presenting the research in terms of key, unsolved problems, encourage interest in the field. Each chapter includes an introduction that is meant to be accessible to all readers followed by a section containing more technical details that may be of greater interest to specialists but still written in an accessible style. The book provides useful reading for undergraduate physical scientists considering a research career in the life science by presenting biological physics in a coherent modern framework. Additionally, it includes material relevant to medicine, pharmaceutics and biotechnology, and demonstrates biological physics with modern examples with a readily approachable style.

About the author

Thomas Andrew Waigh was a physics undergraduate at the University of Edinburgh and then completed a PhD in the Cavendish Laboratory at the University of Cambridge. This was followed by a two-year post-doc at the Collège de France in Paris, in the laboratory of Pierre Giles de Gennes. He then returned to the UK with a lectureship in physics at the University of Leeds. Currently, he is a senior lecturer in biological physics in the School of Physics and Astronomy at the University of Manchester. Previously, he has written two books on biological physics, *Applied Biophysics* and *The Physics of Living Processes: a Mesoscopic Approach*, published by Wiley. He has published more than 80 articles.



Sun Protection

A risk management approach

Brian Diffey
University of Newcastle, UK

iopscience.org/book/978-0-7503-1377-3

About the book

There is adequate evidence that exposure to solar ultraviolet (UV) radiation is a major aetiological factor in human skin cancer, but managing the risk of skin cancer does not necessarily mean avoiding exposure to the Sun's UV rays. *Sun Protection* differentiates itself from other texts by adopting a risk-management approach to determine whether, how, and in what circumstances, harm might be caused, and to explore the feasibility of various strategies in controlling exposure to solar UV radiation. This multi-disciplinary book covers topics from climatology through human exposure to sunlight, as well as biological and clinical effects of UV radiation to physical and chemical strategies for photoprotection.

About the author

Brian Diffey is Emeritus Professor in Dermatological Sciences at the University of Newcastle, UK. His career was spent in the NHS, where he was Professor of Medical Physics and Clinical Director in the Newcastle Hospitals. His involvement with sun protection has spanned more than 40 years and his interests include the measurement of personal sun exposure, its effects in normal and diseased skin, and ways to minimize excessive exposure, especially through the use of topical sunscreens. He invented both the UVA Star Rating for sunscreens in conjunction with Boots in the UK, and the Critical Wavelength adopted by the Food & Drug Administration in the USA as the sole measure of broad spectrum protection. In 1999 he was awarded the Medal of the Society of Cosmetic Scientists for his contributions to suncare, and in 2011 was honoured at the International Sun Protection Conference for significant innovation in the field of photoprotection.

Extent 176pp

Collection
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Subject
Biophysics

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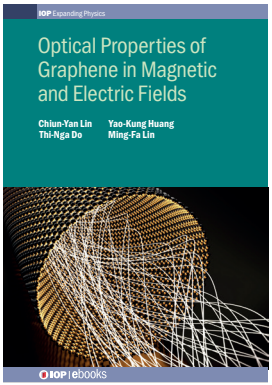

Extent 120pp

Collection
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Subject
Materials science

ISBN 9780750315661 (electronic)

ISBN 9780750315647 (print)

Optical Properties of Graphene in Magnetic and Electric Fields

Chiun-Yan Lin, Thi-Nga Do, Yao-Kung Huang and Ming-Fa Lin
National Cheng Kung University, Taiwan

iopscience.org/book/978-0-7503-1566-1

About the book

Optical Properties of Graphene in Magnetic and Electric Fields provides a synthesis of up-to-date research on the optical properties of graphene, drawing from both experimental and theoretical research. The focus is primarily on multilayer graphenes with a focus on Landau-level spectra and the generalised tight-binding model. The interplay between external fields and the geometric configuration determines relationships between the components of wave functions in different sublattices. This leads to an observation that the optical properties display a strong dependence on the stacking configuration and the number of layers. In general, this model can reasonably comprehend the quantisation effect in arbitrarily stacked graphenes as well as other layered 2D materials such as MoS_2 and silicene. Comparisons between theoretical and experimental work are drawn, as are the different graphene synthesis methods.

About the authors

Chiun-Yan Lin, Thi-Nga Do, Yao-Kung Huang and **Ming-Fa Lin** are all based at the National Cheng Kung University in Taiwan where they collaborate in theoretical solid state physics research and in particular properties of 2D materials.

Physics of Shock and Impact: Volume 1

Fundamentals and dynamic failure

Dennis Grady
Applied Research Associates, USA

iopscience.org/book/978-0-7503-1254-7

Extent 459pp

Collection
Expanding physics

Subject
Materials science

ISBN 9780750312547 (electronic)

ISBN 9780750312554 (print)

About the book

Physics of Shock and Impact deals with the shock physics of solids with emphasis on impact applications that are brought about by intense energy stimulation. Comprising two volumes, this work covers physical, material, mechanical and thermodynamic fundamentals of shock physics. The various chapters also include a range of analytic solutions that address topics in the many applications involving shock physics. Volume 1, *Fundamentals and dynamic failure*, provides an introduction to the fundamentals of shockwave physics and progresses to the modes of shock failure through spall, fragmentation and shear localization.

About the author

Dennis Grady is currently an Associate and Principal Scientist with the South West Division of Applied Research Associates headquartered in Albuquerque, New Mexico. He received his BS in physics and mathematics from Lewis and Clark College in 1967, and a PhD in physics from Washington State University in 1971. Following three years on the research staff of Poulter Laboratory at SRI International, he joined Sandia National Laboratories, retiring in 1996 as a Distinguished Member of the Technical Staff. He joined the South West Division of Applied Research Associates the same year. He has been involved with the experimental measurement and theoretical description of condensed matter under the extreme pressure and temperature stimulus of shock and high-velocity impact for more than 40 years. He has published more than 300 technical papers and reports on a range of materials and applications issues in the intense shock environment including experimental methods, electric and magnetic effects, phase transformation, high-pressure equation of state, transient strength, energetic reaction, hypervelocity impact, and dynamic fragmentation.

Extent 521pp

Collection
Expanding Physics

Subject
Materials science

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ISBN 9780750312585 (print)

Physics of Shock and Impact: Volume 2

Materials and shock response

Dennis Grady
Applied Research Associates, USA

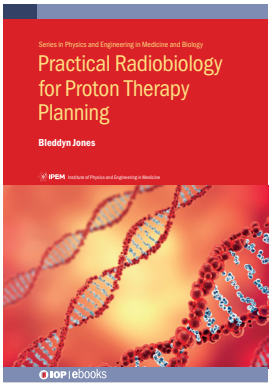
iopscience.org/book/978-0-7503-1257-8

About the book

Physics of Shock and Impact deals with the shock physics of solids with emphasis on impact applications that are brought about intense energy stimulations. Comprising of two volumes, this work covers physical, material, mechanical and thermodynamic fundamentals of shock physics. The various chapters also include a range of analytic solutions that address topics in the many applications involving shock physics. Volume 2, *Materials and shock response*, addresses equation of state in the shockwave and the response to shock of various material classes.

About the author

Dennis Grady is currently an Associate and Principal Scientist with the South West Division of Applied Research Associates headquartered in Albuquerque, New Mexico. He received his BS in physics and mathematics from Lewis and Clark College in 1967, and a PhD in physics from Washington State University in 1971. Following three years on the research staff of Poulter Laboratory at SRI International, he joined Sandia National Laboratories, retiring in 1996 as a Distinguished Member of the Technical Staff. He joined the South West Division of Applied Research Associates the same year. He has been involved with the experimental measurement and theoretical description of condensed matter under the extreme pressure and temperature stimulus of shock and high-velocity impact for more than 40 years. He has published more than 300 technical papers and reports on a range of materials and applications issues in the intense shock environment including experimental methods, electric and magnetic effects, phase transformation, high-pressure equation of state, transient strength, energetic reaction, hypervelocity impact, and dynamic fragmentation.



Practical Radiobiology for Proton Therapy Planning

Bleddyn Jones
The University of Oxford, UK

iopscience.org/book/978-0-7503-1338-4

About the book

Practical Radiobiology for Proton Therapy Planning covers the principles, advantages and potential pitfalls that occur in proton therapy, especially its radiobiological modelling applications. This book is intended to educate, inform and to stimulate further research questions. Additionally, it will help proton therapy centres when designing new treatments or when unintended errors or delays occur. The clear descriptions of useful equations for high LET particle beam applications, worked examples of many important clinical situations, and discussion of how proton therapy may be optimized are all important features of the text. This important book blends the relevant physics, biology and medical aspects of this multidisciplinary subject.

About the author

Bleddyn Jones is Professor of Clinical Radiation Biology at the new Gray Institute for Radiation Oncology and Biology at the University of Oxford, as well as Honorary Consultant in Clinical Oncology, Oxford Radcliffe Hospitals NHS Trust. Over the past 20 years he has been involved with selection and referral of patients abroad for particle therapy. Present research interests include development of new accelerator technology, better prediction of the biological effects of different qualities of radiation and the role of fractionation in particle beam therapy. He is Deputy Director of the Oxford Master of Science course in Radiation Biology and Co-Director of the new Particle Therapy Cancer Research Institute.

Extent 224pp

Collection
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Medical physics and biomedical engineering

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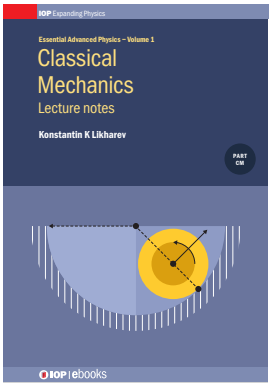

Classical Mechanics

Lecture notes

Konstantin K Likharev
Stony Brook University, NY, USA

iopscience.org/book/978-0-7503-1398-8

About the book

Essential Advanced Physics is a series comprising four parts: *Classical Mechanics, Classical Electrodynamics, Quantum Mechanics* and *Statistical Mechanics*. Each part consists of two volumes, *Lecture notes* and *Problems with solutions*, further supplemented by an additional collection of test problems and solutions available to qualifying university instructors. This volume, C*lassical Mechanics: Lecture notes*, is intended to be the basis for a one-semester graduate-level course on classical mechanics and dynamics, including the mechanics of continua, in particular deformations, elasticity, waves, and fluid dynamics.

About the author

Konstantin K Likharev received his PhD from the Lomonosov Moscow State University, USSR, in 1969, and a habilitation degree of Doctor of Sciences from USSR's High Attestation Committee in 1979. From 1969 to 1990 Dr Likharev was a Staff Scientist of Moscow State University. In 1991 he assumed a Professorship at Stony Brook University (Distinguished Professor since 2002, John S Toll Professor since 2017). During his research career, Likharev worked in the fields of nonlinear classical and dissipative quantum dynamics, and solid-state physics and electronics, notably including superconductor electronics and nanoelectronics – most recently, with applications to neuromorphic networks. He has authored more than 250 original publications, more than 80 review papers and book chapters, two monographs and several patents. Likharev is a Fellow of the APS and IEEE.

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Collection
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Subject
Classical physics

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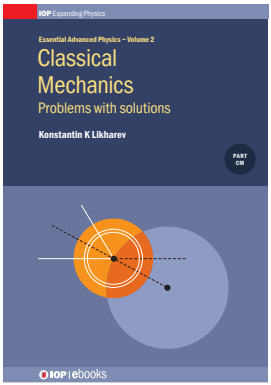

Classical Mechanics

Problems with solutions

Konstantin K Likharev
Stony Brook University, NY, USA

iopscience.org/book/978-0-7503-1401-5

About the book

Essential Advanced Physics is a series comprising four parts: *Classical Mechanics, Classical Electrodynamics, Quantum Mechanics* and *Statistical Mechanics*. Each part consists of two volumes, *Lecture notes* and *Problems with solutions*, further supplemented by an additional collection of test problems and solutions available to qualifying university instructors. This volume, *Classical Mechanics: Problems with solutions* contains detailed model solutions to the exercise problems formulated in the companion *Lecture notes* volume. In many cases, the solutions include result discussions that enhance the lecture material. For the reader's convenience, the problem assignments are reproduced in this volume.

About the author

Konstantin K Likharev received his PhD from the Lomonosov Moscow State University, USSR, in 1969, and a habilitation degree of Doctor of Sciences from USSR's High Attestation Committee in 1979. From 1969 to 1990 Dr Likharev was a Staff Scientist of Moscow State University. In 1991 he assumed a Professorship at Stony Brook University (Distinguished Professor since 2002, John S Toll Professor since 2017). During his research career, Likharev worked in the fields of nonlinear classical and dissipative quantum dynamics, and solid-state physics and electronics, notably including superconductor electronics and nanoelectronics – most recently, with applications to neuromorphic networks. He has authored more than 250 original publications, more than 80 review papers and book chapters, two monographs and several patents. Likharev is a Fellow of the APS and IEEE.

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Collection
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Series
Essential Advanced Physics – Volume 2

Subject
Classical physics

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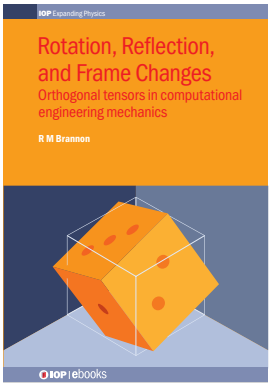

Extent 538pp

Collection
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Subject
Classical physics

ISBN 9780750314541 (electronic)

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Rotation, Reflection, and Frame Changes

Orthogonal tensors in computational engineering mechanics

Rebecca M Brannon
University of Utah, Utah, USA

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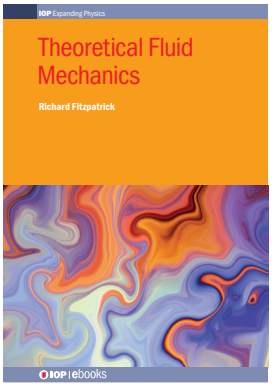
About the book

Whilst vast literature is available for the most common rotation-related tasks such as coordinate changes, most reference books tend to cover one or two methods, and resources for less-common tasks are scarce. Specialized research applications can be found in disparate journal articles, but a self-contained comprehensive review that covers both elementary and advanced concepts in a manner comprehensible to engineers is rare. *Rotation, Reflection, and Frame Changes* surveys a refreshingly broad range of rotation-related research that is routinely needed in engineering practice. By illustrating key concepts in computer source code, this book stands out as an unusually accessible guide for engineers and scientists in engineering mechanics.

About the author

Rebecca M Brannon is an ASME fellow with 25 years of experience in computational and theoretical mechanics, emphasizing high-rate destructive deformations of metals, ceramics, and rocks. Her models are applied to armor, ceramic hip replacements, bunker surety, and shaped-charge jet well-bore completion. She is also known for her monographs on mathematics.



Theoretical Fluid Mechanics

Richard Fitzpatrick
The University of Texas, USA

iopscience.org/book/978-0-7503-1554-8

About the book

Theoretical Fluid Mechanics has been written to aid physics students who wish to pursue a course of self-study in fluid mechanics. It is a comprehensive, completely self-contained text with equations of fluid mechanics derived from first principles, and any required advanced mathematics is either fully explained in the text, or in an appendix. It is accompanied by about 180 exercises with completely worked out solutions. It also includes extensive sections on the application of fluid mechanics to topics of importance in astrophysics and geophysics. These topics include the equilibrium of rotating, self-gravitating, fluid masses; tidal bores; terrestrial ocean tides; and the Eddington solar model.

Extent 784pp

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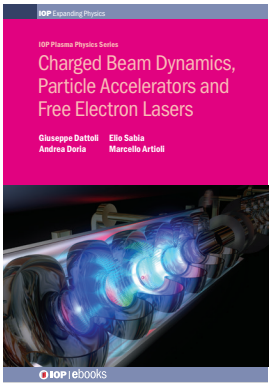
ISBN 9780750315524 (print)

About the author

Richard Fitzpatrick is a professor of physics at the University of Texas at Austin, where he has been a faculty member since 1994. He is a member of the Royal Astronomical Society, a fellow of the American Physical Society, and the author of *Maxwell's Equations and the Principles of Electromagnetism* (2008), *An Introduction to Celestial Mechanics* (2012), *Oscillations and Waves: An Introduction* (2013), *Plasma Physics: An Introduction* (2014), and *Quantum Mechanics* (2015). He earned a master's degree in physics from the University of Cambridge and a DPhil in astronomy from the University of Sussex.



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Series
IOP Plasma Physics Series

Subject
Plasma physics

ISBN 9780750312394 (electronic)

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Charged Beam Dynamics, Particle Accelerators and Free Electron Lasers

Giuseppe Dattoli, Andrea Doria, Elio Sabia and Marcello Artioli
ENEA Frascati Research Center, Frascati (Rome) Italy

iopscience.org/book/978-0-7503-1239-4

About the book

Charged Beam Dynamics, Particle Accelerators and Free Electron Lasers summarises different topics in the field of accelerators and of Free Electron Laser (FEL) devices. It is intended as a reference manual for the different aspects of FEL devices, explaining how to design both a FEL device and the accelerator providing the driving beam. It covers both theoretical and experimental aspects, allowing researchers to attempt a first design of a FEL device in different operating conditions. It provides an analysis of what is already available, what is needed, and what the challenges are to determine new progress in this field. All chapters contain complements and exercises that are designed in such a way that the reader will gradually acquire self-confidence with the matter treated in the book.

About the authors

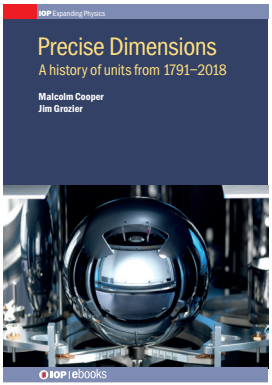
The authors are researchers at the ENEA-Frascati Research Center in Italy.

Giuseppe Dattoli has been involved in high-energy accelerators, FELs, and applied mathematics networks since 1979.

Andrea Doria's research interests include Cerenkov-based FELs and compact FEL sources in the millimetre and far IR regions.

Elio Sabia has been involved in theoretical problems connected with particle dynamics in high-energy electron accelerator-driven FELs.

Marcello Artioli works on control systems and computer science.



Precise Dimensions

A history of units from 1791–2018

Malcolm Cooper and Jim Grozier
The History of Physics Group of the IOP, UK

iopscience.org/book/978-0-7503-1487-9

Extent 180pp

Collection
Expanding Physics

Subject
General physics

ISBN 9780750314879 (electronic)

ISBN 9780750314855 (print)

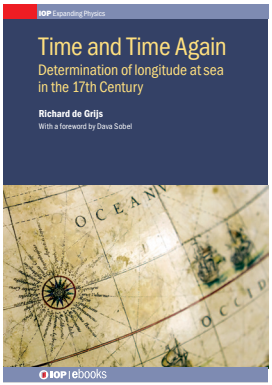
About the book

Units are the foundation for all measurement of the natural world, and from which standard, our understanding develops. This book, stemming from a conference on the history of units organised by the editors, provides a comprehensive and discursive introduction to the history of units within physics, in advance of the proposed redefinition of the SI base units at the General Conference on Weights and Measures in 2018. *Precise Dimensions: A history of units from 1791–2018* features contributions from leading researchers in metrology and history, and will be of particular interest to historians of science, as well as to scientists with an interest in the history of the units they work with.

About the authors

Malcolm Cooper has served as a member of the IOP History of Physics group for 30 years, and during that time, has served on the group's committee in several capacities for many years, including as chairman and secretary. Since 2004, he has served as Editor of the group's newsletter.

Jim Grozier is a retired physicist and engineer, now working as a lab demonstrator at University College London. His research interests include the philosophy of measurement in the physical sciences, and popular (mis) conceptions of special relativity. He is a member of the Committee of the History of Physics Group, and has published frequently on the history of physics.



Time and Time Again

Determination of longitude at sea in the 17th Century

Richard de Grijs
Kavli Institute for Astronomy and Astrophysics, Peking University, China

iopscience.org/book/978-0-7503-1194-6

Extent 368pp

Collection
Expanding Physics

Subject
General physics

ISBN 9780750311946 (electronic)

ISBN 9780750311953 (print)

About the book

Determination of one's longitude at sea has perplexed sailors for many centuries. The significant uptake of world trade in the 17th and 18th Centuries rendered the increasingly urgent need to solve the 'longitude problem', an issue of strategic national importance. Historical accounts of these efforts often focus almost exclusively on John Harrison's role in 18th-Century Britain. This book starts instead from Galileo Galilei's late-16th-Century development of an accurate pendulum clock, which was first achieved in practice in the mid-17th-Century by Christiaan Huygens in the Dutch Republic. It is primarily based on collections of letters that have not been combined into a single volume before. Extensive introductory chapters on the history of map making, the establishment of the world's reference meridian at Greenwich Observatory, and the rise of the scientific enterprise provide the appropriate context for non-expert readers to fully engage with the book's main subject matter.

About the author

Richard de Grijs has been a professor at the Kavli Institute for Astronomy and Astrophysics at Peking University in China since 2009. He was the founding director (2012–2016) of the East Asian Regional Office of Astronomy for Development, and has held the role of Discipline Scientist (Astrophysics) at the International Space Science Institute – Beijing since 2015. His research focuses on many aspects of star cluster physics, and he is also currently engaged in a number of research projects related to the history of astronomy, with special emphasis on the 17th Century.

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