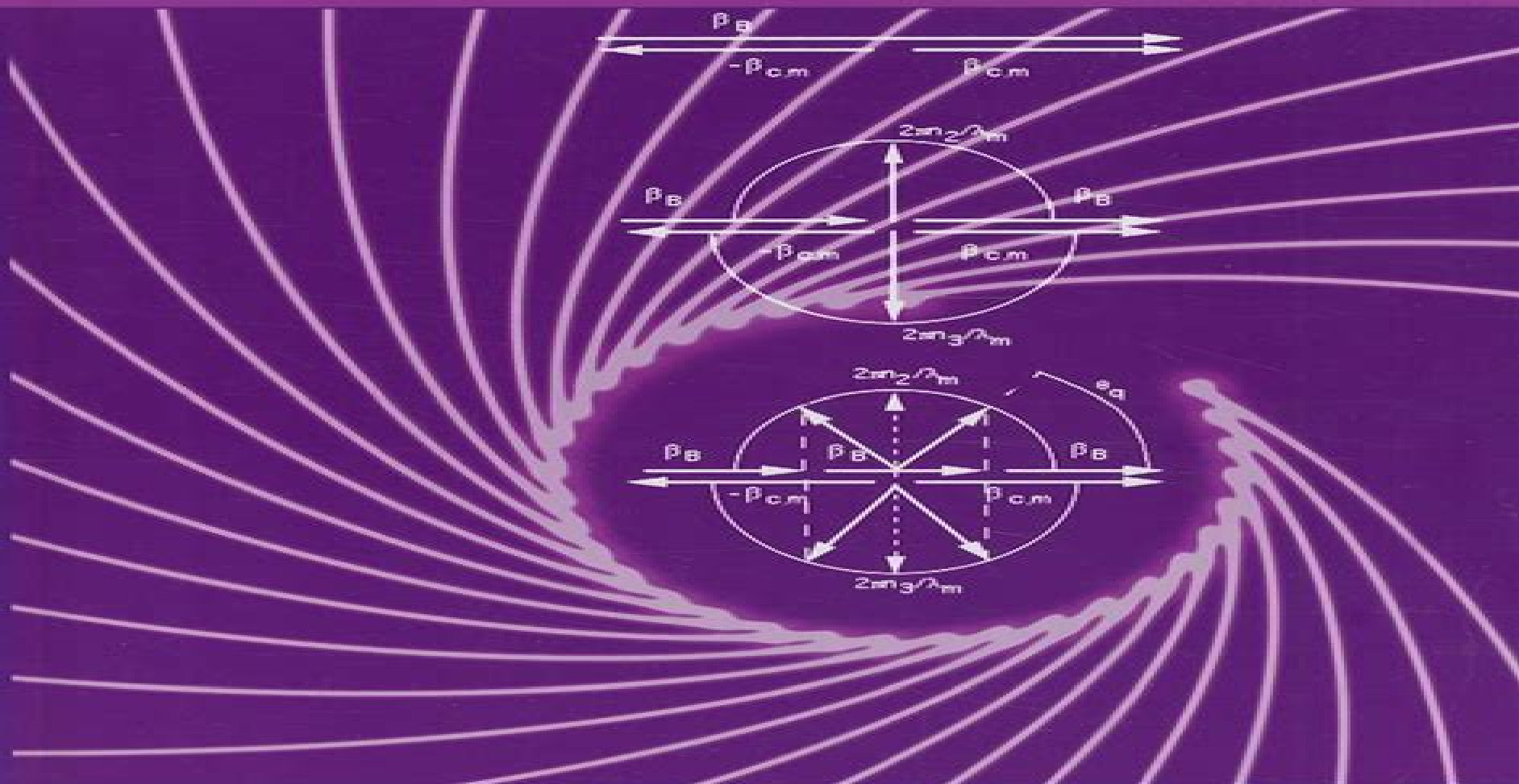


# HANDBOOK OF Distributed Feedback Laser Diodes

SECOND EDITION



GEERT MORTHIER • PATRICK VANKWIKELBERGE

# Handbook Of Distributed Feedback Laser Diodes Artech House Applied Photonics

**H. Ghafouri-Shiraz**



## **Handbook Of Distributed Feedback Laser Diodes Artech House Applied Photonics:**

*Handbook of Distributed Feedback Laser Diodes* Geert Morthier, Patrick Vankwikelberge, 2013 Since the first edition of this book was published in 1997 the photonics landscape has evolved considerably and so has the role of distributed feedback DFB laser diodes Although tunable laser diodes continue to be introduced in advanced optical communication systems DFB laser diodes are still widely applied in many deployed systems This also includes wavelength tunable DFB laser diodes and DFB laser diode arrays usually integrated with intensity or phase modulators and semiconductor optical amplifiers This valuable resource gives professionals a comprehensive description of the different effects that determine the behavior of a DFB laser diode Special attention is given to two new chapters on wavelength tunable DFB laser diodes and bistable and unstable DFB laser diodes Among many other updates throughout the reference semi conductor and electromagnetic professionals are also provided two new appendices This book fully covers the underlying theory commercial applications necessary design criteria and future direction of this technology

**Applied Nanophotonics** Sergey V. Gaponenko, Hilmi Volkan Demir, 2019 An accessible yet rigorous introduction to nanophotonics covering basic principles technology and applications in lighting lasers and photovoltaics Providing a wealth of information on materials and devices and over 150 color figures it is the go to guide for students in electrical engineering taking courses in nanophotonics

**Introduction to Semiconductor Lasers for Optical Communications** David J. Klotzkin, 2013-11-30 This textbook provides a thorough and accessible treatment of semiconductor lasers from a design and engineering perspective It includes both the physics of devices as well as the engineering designing and testing of practical lasers The material is presented clearly with many examples provided Readers of the book will come to understand the finer aspects of the theory design fabrication and test of these devices and have an excellent background for further study of optoelectronics This book also Provides a multi faceted approach to explaining the theories behind semiconductor lasers utilizing mathematical examples illustrations and written theoretical presentations Offers a balance of relevant optoelectronic topics with specific attention given to distributed feedback lasers growth techniques and waveguide cavity design Provides a summary of every chapter worked examples and problems for readers to solve Incorporates and explains recent breakthroughs in laser design

*Handbook of Distributed Feedback Laser Diodes, Second Edition* Geert Morthier, Patrick Vankwikelberge, 2013-09-01 Since the first edition of this book was published in 1997 the photonics landscape has evolved considerably and so has the role of distributed feedback DFB laser diodes Although tunable laser diodes continue to be introduced in advanced optical communication systems DFB laser diodes are still widely applied in many deployed systems This also includes wavelength tunable DFB laser diodes and DFB laser diode arrays usually integrated with intensity or phase modulators and semiconductor optical amplifiers This valuable resource gives professionals a comprehensive description of the different effects that determine the behavior of a DFB laser diode Special attention is given to two new chapters on wavelength tunable DFB laser diodes and bistable and

unstable DFB laser diodes Among many other updates throughout the reference semi conductor and electromagnetic professionals are also provided two new appendices This book fully covers the underlying theory commercial applications necessary design criteria and future direction of this technology

**Natural Photonics and Bioinspiration** Olivier Deparis,Sébastien R. Mouchet,2021-09-30 Photonic structures occurring in biological tissues such as butterfly wings beetle elytra or fish scales are responsible for a broad range of optical effects including iridescence narrow band reflection large solid angle scattering polarization effects additive color mixing fluid induced color changes controlled fluorescence Studies have provided understanding of the underlying optical mechanisms and the biological functions as well as inspiration for the design and development of novel photonic devices also called bioinspiration In this forward thinking book the research related to photonic structures in natural organisms is reviewed with a main fo

Photonic structures occurring in biological tissues such as butterfly wings beetle elytra or fish scales are responsible for a broad range of optical effects including iridescence narrow band reflection large solid angle scattering polarization additive color mixing fluid induced color changes and controlled fluorescence This book reviews research of biological photonic devices in accordance with the fundamental aspects of physical optics and environmental biology It provides readers with an understanding of numerical modelling based on morphological and optical characterizations as well as the quantitative treatment of color vision This forward thinking book ties these concepts to the design and synthesis of bioinspired photonic devices and opens the door to the applications of nature s lessons in the technical world This resource introduces a methodology for working with and utilizing bioinspiration It includes the experimental and numerical tools necessary for the characterization and simulation of photonic structures and uses original concepts as examples with a focus on bioinspired hygrochromatic materials Professionals are brought up to speed on a variety of fabrication techniques and methods of synthesis all following a straightforward bottom up or top down approach The reader will gain an understanding of the capability of bioinspiration to meet human needs This book s explanation of how natural photonics structures behave as efficient solar absorbers or thermal management devices makes it a useful resource for technical professionals in the field of energy and environment and the concepts presented in this book also have applications in the designs of optical coatings sensors and light sources

The ABCs of Fiber Optic Communication Sudhir Warier,2017-04-30 This unique practical handbook is the only one of its kind to provide the conceptual framework and troubleshooting tactics related to the manufacturing selection and installation of modern photonic networks including optical fiber plants optical transceivers test and measurement equipment and network architecture of SDH OTN IP MPLS FTTx networks and PON This resource includes the latest technological advancements and industry applications while covering the entire fiber ecosystem from installation to troubleshooting This book presents the use of common tools like LPM laser source and power meter to overcome common issues related to optical patching and fiber plants and also discusses the use of specialized tools including the optical time domain reflectometer OTDR for issues with

fiber plants and locating fiber breaks Readers gain an understanding of the architecture of core TDM IP and Optical Access Networks including PON Specific methodologies are explored for assessing OTN DWDM IT MPLS Optical Access Networks PON GPON or FTTx networks Key parameters that influence the choice of fiber based on the network and application type are discussed This book also provides an overview of the current and future developments in optical fibers interfaces transceivers and backbone networks *Numerical Simulations of Physical and Engineering Processes* Jan

Awrejcewicz,2011-09-26 Numerical Simulations of Physical and Engineering Process is an edited book divided into two parts Part I devoted to Physical Processes contains 14 chapters whereas Part II titled Engineering Processes has 13 contributions The book handles the recent research devoted to numerical simulations of physical and engineering systems It can be treated as a bridge linking various numerical approaches of two closely inter related branches of science i e physics and engineering Since the numerical simulations play a key role in both theoretical and application oriented research professional reference books are highly needed by pure research scientists applied mathematicians engineers as well post graduate students In other words it is expected that the book will serve as an effective tool in training the mentioned groups of researchers and beyond *Springer Handbook of Optical Networks* Biswanath Mukherjee,Ioannis Tomkos,Massimo Tornatore,Peter

Winzer,Yongli Zhao,2020-10-15 This handbook is an authoritative comprehensive reference on optical networks the backbone of today s communication and information society The book reviews the many underlying technologies that enable the global optical communications infrastructure but also explains current research trends targeted towards continued capacity scaling and enhanced networking flexibility in support of an unabated traffic growth fueled by ever emerging new applications The book is divided into four parts Optical Subsystems for Transmission and Switching Core Networks Datacenter and Super Computer Networking and Optical Access and Wireless Networks Each chapter is written by world renown experts that represent academia industry and international government and regulatory agencies Every chapter provides a complete picture of its field from entry level information to a snapshot of the respective state of the art technologies to emerging research trends providing something useful for the novice who wants to get familiar with the field to the expert who wants to get a concise view of future trends **The Fiber-Optic Gyroscope, Third Edition** Herve C. Lefevre,2022-01-31 This

landmark work considered by many in the field to be THE reference on fiber optic gyroscopes FOGs provides you with a complete and thorough system analysis of the FOG and remains unmatched by any other single source Now in its third edition this fully updated and authoritative book Gives you access to all the details you need to know about optics single mode fiber optics and integrated optics to fully grasp the design rules of the fiber optic gyroscope Helps you understand the concepts that have emerged as the preferred solutions to obtain a practical device Guides you through the advances that have occurred in the last seven years since the previous edition was published and how they are implemented in the current FOGs Drawing on 45 years of research and development The Fiber Optic Gyroscope Third Edition features new content on

the relationship between white noise power spectral density and random walk Allan variance testing with optical coherence domain polarimetry a new simple mechanical model of the thermally induced stresses and related strains in the sensing coil simple viewing of the reduction of the Shupe effect with symmetrical windings and comments about dispersion and birefringence dispersion The book contains over 350 illustrations including 70 new figures and many helpful appendixes and gives you everything you need to understand the fiber gyro The author is a leading expert in this field and is one of the early pioneers of the practical optical architecture and signal processing technique that is universally used in today's FOGs This is a must have reference for anyone working with FOGs from students and academics learning about the device to optoelectronics engineers and professionals needing to stay abreast of the current concepts and recent advances

*Optoelectronic Integrated Circuit Design and Device Modeling* Jianjun Gao, 2011-09-19 In *Optoelectronic Integrated Circuit Design and Device Modeling* Professor Jianjun Gao introduces the fundamentals and modeling techniques of optoelectronic devices used in high speed optical transmission systems Gao covers electronic circuit elements such as FET HBT MOSFET as well as design techniques for advanced optical transmitter and receiver front end circuits The book includes an overview of optical communication systems and computer aided optoelectronic IC design before going over the basic concept of laser diodes This is followed by modeling and parameter extraction techniques of lasers and photodiodes Gao covers high speed electronic semiconductor devices optical transmitter design and optical receiver design in the final three chapters Addresses a gap within the rapidly growing area of transmitter and receiver modeling in OEICs Explains diode physics before device modeling helping readers understand their equivalent circuit models Provides comprehensive explanations for E O and O E conversions done with laser and photodiodes Covers an extensive range of devices for high speed applications Accessible for students new to microwaves Presentation slides available for instructor use This book is primarily aimed at practicing engineers researchers and post graduates in the areas of RF microwaves IC design photonics and lasers and solid state devices The book is also a strong supplement for senior undergraduates taking courses in RF and microwaves Lecture materials for instructors available at [www.wiley.com/go/gao](http://www.wiley.com/go/gao)

**Plasmonic Optical Fiber Biosensors** Christophe Caucheteur, M  d  ric Loyez, 2023-04-30 This book provides a thorough vision of the current trends in plasmonic optical fiber biochemical sensing It gathers the most recent technological information and shows the maturity reached by the different subsequent technologies Demonstrating roadmaps for the design process and implementation of plasmonic optical fiber biochemical sensors the book bridges the gap between theory and application With this philosophy understanding key physical properties is of paramount importance for the efficient design of sensing platforms that will meet target specifications You will learn about the role of the fiber configuration and the functional coating on the properties of the resulting optrodes You will also get an encompassing overview on all optical fiber configurations used for plasmonic sensing thus far especially on the progress made over the last decade and rendering the technology compatible for use in real

conditions The book presents both fundamental aspects and advanced applications while focusing on recent and emerging fields of research such as the use of tilted fiber Bragg gratings the integration of sensors in situ the use of smart interrogation techniques and much more This is a unique reference for both beginners and experts in optical fiber based sensors especially for industrial engineers working in biophotonics and biochemical sensing as it presents state of the art design procedures and sensing features The book s theoretical background combined with recent advances of plasmonic based optical fiber technologies also make it highly beneficial for all researchers academics and students specialized or interested in this flourishing and promising discipline *Global Optimization* János D. Pintér, 2006-10-13 Optimization models based on a nonlinear systems description often possess multiple local optima The objective of global optimization GO is to find the best possible solution of multiextremal problems This volume illustrates the applicability of GO modeling techniques and solution strategies to real world problems The contributed chapters cover a broad range of applications from agroecosystem management assembly line design bioinformatics biophysics black box systems optimization cellular mobile network design chemical process optimization chemical product design composite structure design computational modeling of atomic and molecular structures controller design for induction motors electrical engineering design feeding strategies in animal husbandry the inverse position problem in kinematics laser design learning in neural nets mechanical engineering design numerical solution of equations radiotherapy planning robot design and satellite data analysis The solution strategies discussed encompass a range of practically viable methods including both theoretically rigorous and heuristic approaches

**Micro- and Opto-Electronic Materials and Structures: Physics, Mechanics, Design, Reliability, Packaging**

Ephraim Suhir, Y.C. Lee, C.P. Wong, 2007-05-26 This handbook provides the most comprehensive up to date and easy to apply information on the physics mechanics reliability and packaging of micro and opto electronic materials It details their assemblies structures and systems and each chapter contains a summary of the state of the art in a particular field The book provides practical recommendations on how to apply current knowledge and technology to design and manufacture It further describes how to operate a viable reliable and cost effective electronic component or photonic device and how to make such a device into a successful commercial product **Optoelectronic Materials and Devices for Optical Communications**

Shinji Tsuji, Jens Buus, Yi Luo, 2005 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature **Rare-earth-doped Devices** , 1997 **Subject Guide to Books in Print** , 1991

Coherent Lightwave Communication Systems Shiro Ryu, 1995 Gain full access to the history and implementation of coherent lightwave communication systems Packed with information on narrow linewidth lasers this book provides you with detailed discussion on circuit design techniques for receivers methods of overcoming polarization fluctuation multi gigabit

systems and the construction of long distance optical links      *Distributed Feedback Laser Diodes and Optical Tunable Filters* H. Ghafouri-Shiraz, 2003-11-07 Advances in optical fibre based communications systems have played a crucial role in the development of the information highway By offering a single mode oscillation and narrow spectral output distributed feedback DFB semiconductor laser diodes offer excellent optical light sources as well as optical filters for fibre based communications and dense wavelength division multiplexing DWDM systems This comprehensive text focuses on the basic working principles of DFB laser diodes and optical filters and details the development of a new technique for enhanced system performance Considers the optical waveguiding characteristics and properties of semiconductor materials and the physics of DFB semiconductor lasers Presents a powerful modelling technique based on the transfer matrix method which can be used to improve the design of laser diodes optical fibres and amplifiers Examines the effect of the various corrugation shapes on the coupling coefficients and lasing characteristics of DFB laser diodes Technical advice to improve immunity against the spatial hole burning effect Extensive referencing throughout and a comprehensive glossary of symbols and abbreviations Suitable for both introductory and advanced levels This is an indispensable textbook for undergraduate and postgraduate students of electrical and electronic engineering and physics as it consolidates their knowledge in this rapidly growing field As a technical guide for the structural design of DFB laser diodes and optical filters the book will serve as an invaluable reference for researchers in opto electronics and semi conductor device physics      **Distributed Feedback Semiconductor Lasers** John E. Carroll, James Whiteaway, Dick Plumb, 1998 Concentrating on presenting a thorough analysis of DFB lasers from a level suitable for research students this book emphasises and gives extensive coverage of computer aided modeling techniques      **Distributed Feedback Laser Diodes** Dr. H. Ghafouri-Shiraz, B. S. K. Lo, 1996-08-06 *Distributed Feedback Laser Diodes Principles and Physical Modelling* H Ghafouri Shiraz B S K Lo University of Birmingham UK Advances in optical fibre based communications systems have played a crucial role in the development of the information highway By offering a single mode oscillation and narrow spectral output distributed feedback DFB semiconductor laser diodes offer an excellent optical light source for fibre based communication systems This comprehensive text focuses on the basic working principles of DFB laser diodes and details the development of a new technique for enhanced system performance Considers the optical waveguiding characteristics and properties of semiconductor materials and the physics of DFB semiconductor lasers Presents a powerful modelling technique based on the transfer matrix method which can be used to improve the design of laser diodes optical filters and amplifiers Examines the effect of the various corrugation shapes on the coupling coefficients and lasing characteristics of DFB laser diodes Technical advice to improve immunity against the spatial hole burning effect Extensive referencing throughout and a comprehensive glossary of symbols and abbreviations *Distributed Feedback Laser Diodes* is an indispensable text for senior students of electrical and electronic engineering and physics and will consolidate their knowledge in this rapidly growing field As a technical guide for the structural design of



DFB laser diodes it will serve as an invaluable reference for researchers in optoelectronics and semiconductor and device physics

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