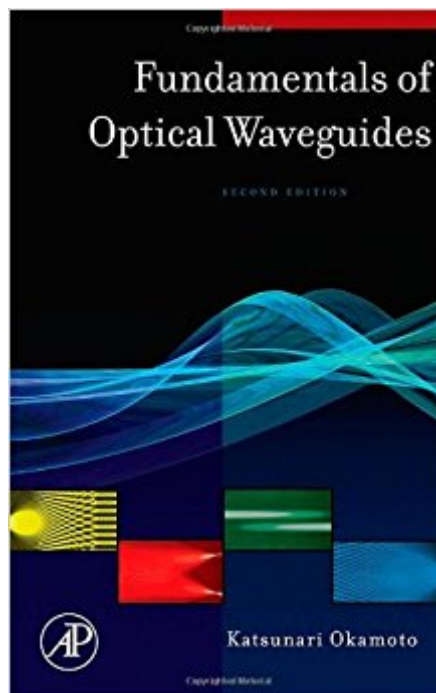




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# Fundamentals Of Optical Waveguides, Second Edition (Optics And Photonics Series)



## Synopsis

Fundamentals of Optical Waveguides is an essential resource for any researcher, professional or student involved in optics and communications engineering. Any reader interested in designing or actively working with optical devices must have a firm grasp of the principles of lightwave propagation. Katsunari Okamoto has presented this difficult technology clearly and concisely with several illustrations and equations. Optical theory encompassed in this reference includes coupled mode theory, nonlinear optical effects, finite element method, beam propagation method, staircase concatenation method, along with several central theorems and formulas. Since the publication of the well-received first edition of this book, planar lightwave circuits and photonic crystal fibers have fully matured. With this second edition the advances of these fibers along with other improvements on existing optical technologies are completely detailed. This comprehensive volume enables readers to fully analyze, design and simulate optical atmospheres. Exceptional new chapter on Arrayed-Waveguide Grating (AWG) In-depth discussion of Photonic Crystal Fibers (PCFs) Thorough explanation of Multimode Interference Devices (MMI) Full coverage of polarization Mode Dispersion (PMD)

## Book Information

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## Customer Reviews

"...the second edition of Fundamentals of Optical Waveguides emphasizes optical theory, including coupled-mode theory, nonlinear optical effects, and finite element, beam propagation and staircase

concatenation methods...A new chapter on arrayed-waveguide grating discusses the principles of operation, fundamental characteristics and analytical treatment of the grating demultiplexing properties." - Photonics Spectra, Sept. 2006

The internet and communication systems depend on optical waveguides for success; this book provides a rigorous and up-to-date introduction to this technology!

A fundamental book for any who step into the world of optical integrated devices, and its specific optics.

just OK . OK, there is do not have any problem. I got it in the mail and it came in a nice case which I enjoyed. I love the feel and how heavy it is. When I got it, I immediately washed it and tested it out and it cut through some peppers like butter. I really liked it. with the best service . give my parents ,

Fundamental to the science of fiber optics is knowledge about how light behaves in optical waveguides. Subjects of interest include waveguides made of optical fiber as well as planar waveguides in optical integrated circuits. Issues include the modal distribution of optical energy in the waveguides, nonlinear effects, and the ability of the waveguide to transmit large amounts of data without degradation or errors. Okamoto's book addresses all of these subjects in detail, forming a convenient single-source reference for the practicing scientist, engineer, or graduate student. Okamoto's book is exceptionally well organized, and explains advanced and sometimes difficult concepts easily. The subject material and mathematical detail assume the reader to be well grounded in the basics of fiber optics, and able to work comfortably with differential, vector, and integral calculus. In addition, concepts such as Bessel functions, Maxwell's equations, and the nonlinear Schrodinger equation are used without introduction. Although not formally organized in parts, the subject matter can be broadly divided into three categories. The first category consists of a basic treatment of waveguides in general, including the derivation of the functional forms of the eigenmodes in slab, rectangular, cylindrical, and coupled waveguides. I found the discussion on coupled mode theory particularly useful. Derivation of the eigenmodes is rigorous, with few simplifying assumptions. The equations are generally in Cartesian coordinates, making them useful for general-purpose numerical simulations, which are discussed in detail later in the book. Some of the more important equations should probably have been expressed in cylindrical coordinates as well, as this would make them more applicable for back-of-the envelope calculations. Making the

simplifications is not hard, however, and there are blank pages at the end of the book for customizing it with these additional equations. Also lacking is a glossary of definitions of mathematical symbols used throughout the book. The second category consists of specific, highly detailed and mathematically intense discussions about numerical methods used to solve the intensity distribution of light in inhomogeneous-core planar waveguides and fibers. Topics include the beam propagation method, staircase concatenation method, and finite element method. The discussions are sufficiently detailed that the capable and enthusiastic student should be able to write computer code that solves the propagation characteristics of virtually any arbitrary waveguide. Although commercial software already does this, the background presented in Okamoto's book will be useful to the user of such software, providing insight as to how the software works, and its limitations. Straddling the discussion of numerical methods are discussions on nonlinear effects in optical fibers and planar lightwave circuits. The discussion on nonlinear optics is one of the best single-chapter treatments of the subject that I've seen, with quantitative explanations of solitons (light and dark), self-phase modulation (the optical Kerr effect), Raman scattering, and Brillouin scattering. There is also a brief discussion about optical amplification. Surprisingly, however, the book fails to discuss four-wave mixing. The chapter on planar lightwave circuits is one of the best quantitative descriptions of the arrayed waveguide grating I've ever seen. Overall, this is an excellent book that will be a valuable resource for scientists and engineers involved in fiber optics. I highly recommend it.

This is a very good book for optical waveguide design. After the first dozen pages, the book dives into a very detail, and theoretical descriptions. I don't think it was aimed to the working engineer/scientist, nor the undergraduate student. If you're OK with Bessel functions, solving boundary conditions and are comfortable with describing designs with eigenstates, then this is for you. If you're getting into the area, this is a more advanced book. Either case, it does belong on any serious optical waveguide designers shelf (there's a lot of material in this book).

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