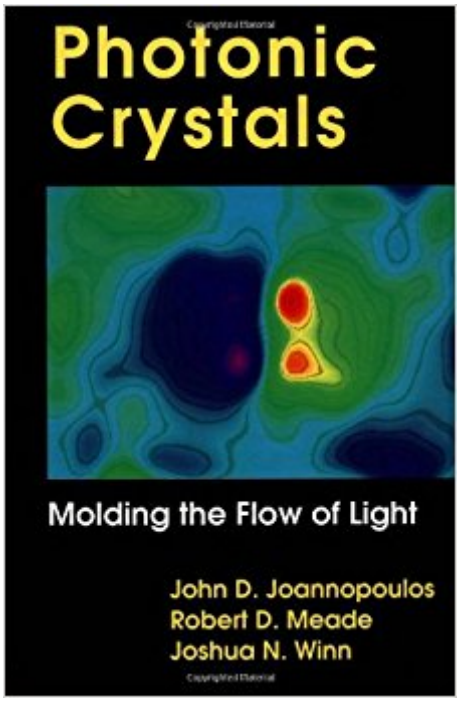
Photonic Crystals: Molding The Flow Of Light



Synopsis

Photonic Crystals is the first book to address one of the newest and most exciting developments in physics--the discovery of photonic band-gap materials and their use in controlling the propagation of light. Recent discoveries show that many of the properties of an electron in a semiconductor crystal can apply to a particle of light in a photonic crystal. This has vast implications for physicists, materials scientists, and electrical engineers and suggests such possible developments as an entirely optical computer. Combining cutting-edge research with the basic theoretical concepts behind photonic crystals, the authors present to undergraduates and researchers a concise, readable, and comprehensive text on these novel materials and their applications. The first chapters develop the theoretical tools of photonic crystals in a broad, intuitive fashion, starting from nothing more than Maxwell’s equations and Fourier analysis, and include analogies to traditional solid-state physics and quantum theory. There follows an investigation of the unique phenomena that take place within photonic crystals, at defect sites, and at surfaces and interfaces. The authors offer a new treatment of the traditional multilayer film (a one-dimensional photonic crystal), which allows for the extension to higher dimensions and more complex geometries. After exploring the capabilities of photonic crystals to guide and localize light, the authors demonstrate how these notions can be put to work.

Book Information

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Customer Reviews

As a co-author of the new edition, I’m obviously a bit biased, but I think this book occupies a unique

position in this field as a broad advanced-undergraduate/beginning-graduate introduction to photonic crystals and light in periodic media, focusing on timeless fundamentals and richly illustrated with examples of many different structures. Compared to the first edition, it is greatly expanded and improved, with almost every chapter seeing significant revisions and several entirely new chapters; the second edition is roughly double the length of the first.However, the main reason I am posting here is that you don’t need to take my word for it; the publishers have allowed us to post a PDF of the entire book online for no cost, so you can determine whether it is useful to you before purchasing the paper version (beautifully printed in full color). See ab-initio.mit.edu/book (where you can also find errata etcetera).Compared to classic textbooks like Hecht or Jackson, this book occupies a somewhat different ground. It is not concerned with geometric optics (where the wavelength is small compared to the structure) or with the handful of geometries that can be solved almost completely analytically (vacuum, planes, cylinders, and spheres). Rather, it deals with the vast array of problems in nanophotonics where the wavelength is comparable to the structure, and especially with periodic (or partially periodic) "crystalline" structures. In these cases, although completely analytical solutions are usually impossible, the book explains how there are more general principles such as symmetry and linear algebra that reveal the fundamental structure and behavior of light in such media.

Keeping in mind, I started my research in photonic crystals with my advisor referring me to this book. So, I am speaking as a first-year graduate student with basic physics background. Hopefully, you come in this category of inexperience looking for some advice on approaching a difficult subject to understand. My only suggestion is to ask around your research group for other reading materials and also get to know your library well. In any case, you can also check out my profile which has a listing of optics and photonic crystal books that can help you out as well. So, I just wanted to let you know where I am coming from since other reviewers might be educators who already have a good understanding of photonic crystals. In some ways, it pretty much assumes alot of knowledge like my advisor who assumed me to be much the same which I was not.In this fairly thin book, Joannopoulos basically rehashes the concepts of photonic crystals from his review papers in journals. Although this book may be appropriate who have read his articles, it probably is not the best source for undergrad/grad students who want to really get the details. The book has some illustrations which may or may not get the point across to readers. For beginners, I would suggest going to "Scientific American" article which Joannopoulos writes to a general audience with little or no background in optics. This gives a wonderful explanation about total internal reflection and how it

relates to fiber optics. Then, it ties into the idea of crystals trapping light. Afterwards, you can consult with an undergrad optics book (Hecht or Pedrotti) which will go into basic optics. The price of this book is also quite expensive for just a short overview.

Photonic Crystals: Molding the Flow of Light, Second Edition Photonic Crystals: Molding the Flow of Light Crystals: Your Beginners Guide To Crystals And Healing Stones (Power of Crystals, Healing Stones,Relieve Stress, Energy Healing) Light Scattering, Size Exclusion Chromatography and Asymmetric Flow Field Flow Fractionation: Powerful Tools for the Characterization of Polymers, Proteins and Nanoparticles The Beginners Guide to Chakra's and Crystals Box Set:: A Beginners Guide To Crystals Their Uses And Healing Powers And Chakras: Understanding The 7 Main ... Gems,Law of Attraction) Crystals: Crystal Healing For Beginners, Discover The Healing Power Of Crystals And Healing Stones To Heal The Human Energy Field, Relieve Stress and Experience Instant Relaxation !-THIRD EDITION- Crystals: The Complete Beginner's Guide to Crystals and Crystal Healing The Essential Guide to Crystals: Tap into the healing power of crystals Teach'n Beginning Offensive Basketball Drills, Plays, and Games Free Flow Handbook (Series 4 Free Flow books 25) Physics of Photonic Devices Photonic Devices Selective Photonic Disinfection: A Ray of Hope in the War Against Pathogens (IOP Concise Physics) Photonic Structures Inspired by Nature (Springer Theses) Creating Original Porcelain Dolls: Modeling, Molding and Painting Plastic Part Design for Injection Molding 2E: An Introduction Injection Molding Machines Secrets of Building a Plastic Injection Molding Machine Injection Molding Molding of Thermosetting Plastics (My First Library) Standard Catalog of American Light-Duty Trucks: Pickups, Panels, Vans, All Models 1896-2000 (Standard Catalog of American Light-Duty Trucks, 1896-2000)