



Pierre-Noel Favennec, has been worth the wait. A uniform voice and consistent notation distinguish the book, making it useful as an introduction for students or as a handbook for practitioners who want to learn about photonic-crystal research outside their

own specialty. The authors are the leading photonic-crystal researchers of France, and we are lucky that an English translation is now available.

The first chapter adapts Maxwell's equations to the periodic environment and introduces the major computational methods that are used to design and analyze photonic crystals. It is useful to see all the different approaches in one place and in a consistent notation, as that presentation helps researchers select the right computational method for a given situation. Meter-kilogram-second (MKS) units are used throughout the book; there seems to be no other choice, since antenna problems invariably lead to $\sqrt{\mu_0 \epsilon_0}$, the impedance of free space.

The book contains a lovely chapter giving a clear exposition of photonic quasicrystals; the quasicrystal concept emerges in full rigor since the photonic versions can be artificially engineered to any desired properties. Nonetheless, the existence of a complete photonic bandgap in quasicrystals is still much debated.

The book pays adequate attention to metallic periodic structures that lead to so-called left-handed electromagnetic properties, metamaterials, and the fertile area of plasmonics. Uniquely, the authors offer a full discussion of applications in microwave engineering. They also present complete coverage of two-dimensional, thin-dielectric-film photonic crystals that engineers are now applying toward commercial nanophotonic circuits employing thin silicon layers. Microcavities and single-photon light sources are treated as well, but it is difficult for the authors to keep up with fast-moving developments. The book covers Q -factors in the thousands, but $Q > 10^6$ has recently been achieved by Takashi Asano, Susumu Noda, and Bong-Shik Song.

The authors include a brief chapter on photonic crystal fibers, but complete volumes dedicated to that topic by other researchers have begun to appear, such as the text by Zolla and his colleagues and *Photonic Crystal Fibres* (Springer, 2003) by Anders Bjarklev, Jes Broeng, and Araceli Sanchez Bjarklev. Photonic

crystals occur in the botanical and zoological worlds as physically based pigments, and yet biological photonic crystals are not mentioned in the book. They deserve a colorful volume of their own, showing what is known, for example, of peacock and parrot feathers.

Overall *Photonic Crystals* is an excellent book that can serve as an introductory text and a reference for graduate students and researchers.

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