

Nieto-Vesperinas, Manuel**Scattering and diffraction in physical optics (to appear). 3rd edition.** (English) Zbl 07291807
Hackensack, NJ: World Scientific (ISBN 978-981-4630-04-7/hbk). 520 p. (2022)

Publisher's description: This book presents a comprehensive tutorial on propagation, diffraction and scattering problems from the basic principles of physical optics. Beginning with the fundamental differential and integral equations for wavefields, the text presents an exhaustive discussion on the extinction theorem as a non-local boundary condition; this has been extensively employed for the rigorous solution of scattering and diffraction problems.

There is also an in-depth presentation of the topic of scattering from rough surfaces, in particular the phenomenon of enhanced backscattering, as well as a detailed development of the angular spectrum representation of fields leading to questions on non-diffraction beams. Of key interest in near field optical microscopy and nanooptics, the S -matrix theory based on the angular spectrum for propagating components and the recently discovered properties of the S -matrix for evanescent components of wavefields are considered. In addition, the book deals with the healing effect of phase conjugation on waves, and focuses on some applications concerning the relationship with time reversal.

Readers will also find discussions on image recovery from partial information data (phase problems and super-resolution problems), as well as a chapter on the fundamentals of near field optical microscopy techniques, including the hot topic of propagation in negative index media.

This latest edition is expanded to deal with more modern topics in a comprehensive way. Also included is an additional chapter on optomechanics manipulation of nanoparticles.

See the review of the second edition in [[Zbl 1110.78001](#)].

MSC:

- 78-01** Introductory exposition (textbooks, tutorial papers, etc.) pertaining to optics and electromagnetic theory
- 78A40** Waves and radiation in optics and electromagnetic theory
- 78A10** Physical optics
- 78A45** Diffraction, scattering
- 78A46** Inverse problems (including inverse scattering) in optics and electromagnetic theory

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