

## Book review

**Multiple Scattering: Interaction of Time-Harmonic Waves with N Obstacles, P.A. Martin. Cambridge University Press, Cambridge, UK (2006). (xii + 437pp., US\$140, Hardbound in dustjacket), ISBN: 0-521-86554-9.**

This exemplary book was published as volume 107 of the Cambridge series “Encyclopedia of Mathematics and Its Applications”. The main purpose of the book is systematic exposition of an important exact approach to solve the problem of scattering of a time-harmonic wave by a fixed morphologically composite object such as a multi-particle group. Specifically, it is assumed that the wave-scattering problem has already been solved for each component particle taken separately and the scattered wave for the entire group is expressed as a superposition of the wavelets scattered by all the component particles. Since each particle is excited not only by the incident wave but also by the partial wavelets coming from all the other particles, the partial wavelets are interdependent and must be determined from an appropriate system of equations. This procedure implies that the total scattered field at the observation point can be expressed as a superposition of waves traveling through all possible sequences of the component particles. Hence the term “multiple scattering”.

The title of the book is ambitious, yet the result is superb. The book covers acoustic, electromagnetic, elastodynamic, and hydrodynamic wave scattering and describes in a thorough and systematic way a broad variety of techniques for solving such problems including separation of variables, integral equations, and T matrices. Chapters 2 and 3 introduce the relevant addition theorems in two and three dimensions while Appendices A–I provide the requisite special mathematical tools; this makes the text sufficiently self-contained. The book is concluded with a uniquely comprehensive reference list and very useful citation and subject indices. The author has quite succeeded in combining a textbook and an encyclopedia volume in one monograph, which is an extremely difficult task.

As a result of the deliberate attempt to narrow the scope of the book and thereby make it manageable, the monograph does not describe in much detail multiple scattering by random arrangements of scatterers and does not include the theory of radiative transfer and coherent backscattering by particulate media. However, covering these vast subjects would require a separate volume and is accomplished, at least partially, in another recent monograph [1].

In summary, the book by P. A. Martin is an absolute must for all Ph.D. students, researchers, and engineers specializing in any discipline dealing with wave scattering by composite objects and its applications. The book is written on the highest professional level and may serve as the basis of a lecture course on multiple wave scattering. The polygraphic quality of the book is impeccable and matches the quality of its contents.

## Reference

- [1] Mishchenko MI, Travis LD, Lacis AA. Multiple scattering of light by particles: radiative transfer and coherent backscattering. Cambridge: Cambridge University Press; 2006.

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