The original book appeared in 1978 in two volumes and has continued to receive attention among several scientific communities. It has been gratifying for me to note that the material in this book has been quoted by many scientists and engineers in medical optics, imaging, polarimetry, localization in disordered material, rough surface scattering, radars, lidars, ocean acoustics, and ultrasound imaging. The book is out of print, and I am grateful to the IEEE Press, Dudley Kay, Director, and D. G. Dudley, Editor of the Electromagnetic Wave Series, for reissuing *Wave Propagation and Scattering in Random Media*. The book is now in one volume and is substantially the same as the original except for some minor corrections.

The field of "waves in random media" has progressed steadily since the appearance of the original book, and several new phenomena and applications have elicited considerable excitement among workers in this field. Therefore, it may be appropriate and useful to give a short account of the recent progress in this field. Selected references since 1978 are also given to aid the readers in learning recent advances in this field.

Progress in the area of wave propagation in turbulence and random continuum has been made in the solutions of the fourth-order moments, the use of path integral techniques, numerical simulations, backscattering enhancement, cross polarization effects, and probability density functions. Many of the topics have been included in a recent book (Tatarskii, Ishimaru, and Zavorotny, 1993). In addition, several books have appeared on this subject (Strohbehn, 1978; Uscinski, 1977; Flatté, 1979; Rytov, Kravtsov, and Tatarskii, 1987). Much of the progress and references are discussed in a review paper (Ishimaru, 1991). Excellent coverage of imaging is given in Zege et al., 1991, and numerical simulations are discussed in Martin and Flatté, 1988.

Volume scattering by randomly distributed particles has been studied intensively. The radiative transfer theory is extended to the vector radiative transfer theory to include all polarization effects, Stokes vector, extinction matrix, and Mueller matrix (Ulaby, Moore, and Fung, 1986; Ulaby and Elachi, 1990; Tsang, Kong, and Shiro, 1985). When the fractional volume is greater than a few percent, the independent scatterer assumption is no
longer valid, and the pair correlation between particles should be included. This dense media theory is discussed in detail in Tsang, Kong, and Shin, 1985. Diffusion approximation has been used extensively in medical optics, including pulse propagation, dynamical correlations, and photon density waves (Tuchin and Thompson, 1994).

Rough surface scattering has received considerable attention. Excellent books and reviews have been published (Bass and Fuks, 1979; DeSanto and Brown, 1986; Ogilvy, 1991; Voronovich, 1994; Fung, 1994). Also noted are the use of extensive numerical Monte-Carlo simulations, controlled experiments, and high-slope scattering (Ishimaru et al., 1991 and 1996).

Some new correlation phenomena have been identified. First, enhanced backscattering, which is caused by the constructive interference of two waves traversing through the same particles in opposite directions, has been noted for particle scattering, rough surface scattering, and turbulence and is identified as a weak Anderson localization phenomenon. Another discovery is memory effects on angular correlation (Feng et al., 1988). These topics are discussed in detail in recent books and papers (Sheng, 1990, 1995; Nieto-Vesperinas and Dainty, 1990; Ishimaru, 1991(b); Celli et al, 1985).

Studies on basic theories and applications of these topics are actively being pursued and a new journal, Waves in Random Media, was launched in 1991. It is hoped that the field of waves in random media will continue to advance in theories and geophysical, biomedical, remote sensing, and imaging applications.

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Selected Recent References


