ELECTROMAGNETIC WAVES PIER 14

Progress In Electromagnetics Research

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Electromagnetic
Scattering by Rough
Surfaces and Random Media

Editors:
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ELECTROMAGNETIC SCATTERING BY ROUGH SURFACES AND RANDOM MEDIA

PREFACE

The technology of sensing using electromagnetic and optical waves requires the understanding of the interactions of electromagnetic waves with geophysical and biological media as well as new materials for various emerging applications. Since propagation problems are closely related to solving the scattering of electromagnetic waves by rough surfaces and random media, this PIER 14 includes recent new results for the study of such problems.

In the chapter by Ishimaru et al., a second-order Kirchhoff theory with shadowing corrections is applied to treat random rough surfaces with high slopes. It includes a good comparison with experimental results.

In the chapter by Kuga et al., experimental techniques in millimeter wave scattering are described. Such controlled laboratory experiments are important in the discovery of new physical phenomena such as backscattering enhancement and memory effects. They are also useful in verification of theoretical results.

In the chapter by Ogura and Takahashi, a stochastic functional method is discussed for scalar wave scattering by two-dimensional random rough surfaces, and numerical results are given for the case of slight roughness.

In the chapter by Au et al., the scattering and absorption in a vegetation canopy at microwave frequencies is treated with the wave approach. Unlike the approach of independent scattering and radiative transfer, the wave approach takes into account the structure of trees and vegetation which can contribute to the collective scattering and absorption effects of branches and leaves.

The chapter by Chen et al. applies the concept of collective scattering and absorption to trees generated by the stochastic Lindenmayer system. The advantage of the Lindenmayer system is that the computer growth procedure produces trees that are realistic in appearance and thus are able to simulate the collective scattering effects of such vegetation structure.

The chapter by Veysoglu and Kong derives the correlation functions rigorously for a random medium model. Such studies are useful to characterize scattering by highly inhomogeneous media.

The chapter by Tateiba and Meng presents an approach to the problem of wave scattering from a conducting body of arbitrary shape and size in a random medium. Numerical results of RCS of a cylinder surrounded by a turbulent medium are also presented.

M. Tateiba and L. Tsang

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