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Advanced electromagnetic wave propagation methods. (English) [Zbl 07390247](#)

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Publisher's description: his textbook provides a solid foundation into many approaches that are used in the analysis of advanced electromagnetic wave propagation problems. The techniques discussed are essential to obtain closed-form solutions or asymptotic solutions and meet an existing need for instructors and students in electromagnetic theory. The book covers various advanced mathematical methods used in the evaluation of the electromagnetic fields in rectangular, cylindrical and spherical geometries. The mathematics of special functions (i.e., Bessel, Hankel, Airy, Legendre, Error, etc.) are covered in depth, including appropriate Appendices. The author takes particular care to provide detailed explanations of auxiliary potentials, Hertz's vectors, Debye potentials, as well as the use of Green functions, the Watson transformation and the method of steepest descent in the solution of electromagnetic problems. Overall, Advanced Electromagnetic Wave Propagation Methods is a good source for the many skills required in obtaining closed form and asymptotic solution, which in many instances cannot be obtained using computer codes of Maxwell's equations. Thus, it provides an excellent training for preparing graduate students in their research work. This book is intended for a graduate course in electromagnetic theory for students in electrical engineering. Students in physics and professionals will also find it appropriate and useful.

- Provides a comprehensive and unified treatment of radiation and propagation problems Presents a detailed explanation in the use of Green functions, the Watson transformation and the method of steepest descent as they apply to electromagnetic problems
- Demonstrates various advanced mathematical techniques used in the evaluation of the electromagnetic fields
- Details how to formulate and obtain a closed-form solution or an asymptotic solution
- ncludes appendices for Bessel, Legendre, Airy and Error functions

MSC:

78-01 Introductory exposition (textbooks, tutorial papers, etc.) pertaining to optics and electromagnetic theory

78A40 Waves and radiation in optics and electromagnetic theory

Full Text: [DOI](#)