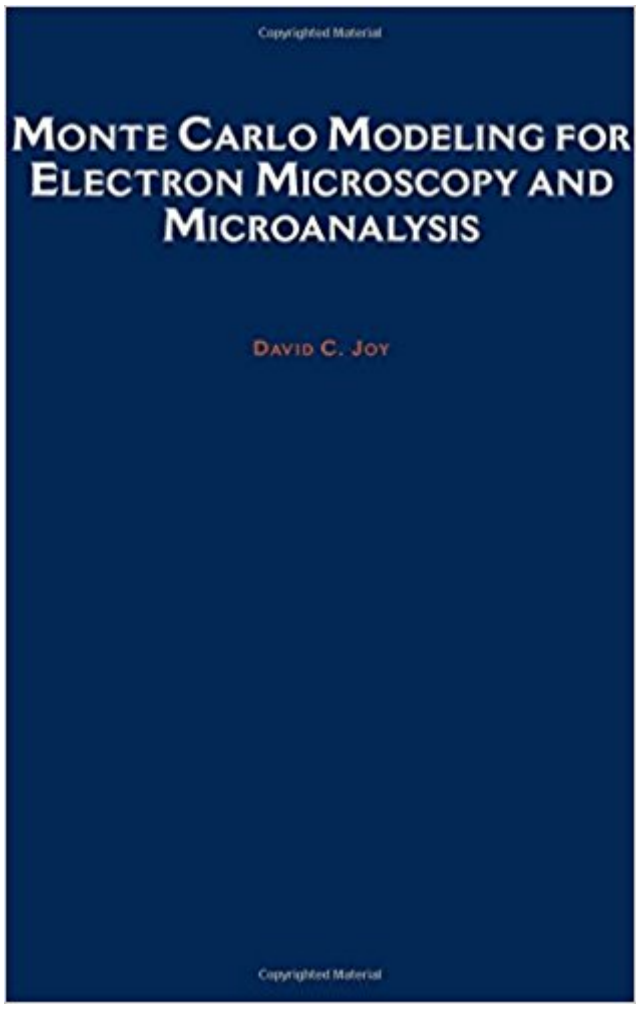
Monte Carlo Modeling For Electron Microscopy And Microanalysis (Oxford Series In Optical And Imaging Sciences)



Synopsis

This book describes for the first time how Monte Carlo modeling methods can be applied to electron microscopy and microanalysis. Computer programs for two basic types of Monte Carlo simulation are developed from physical models of the electron scattering process--a single scattering program capable of high accuracy but requiring long computation times, and a plural scattering program which is less accurate but much more rapid. Optimized for use on personal computers, the programs provide a real time graphical display of the interaction. The programs are then used as the starting point for the development of programs aimed at studying particular effects in the electron microscope, including backscattering, secondary electron production, EBIC and cathodo-luminescence imaging, and X-ray microanalysis. The computer code is given in a fully annotated format so that it may be readily modified for specific problems. Throughout, the author includes numerous examples of how such applications can be used. Students and professionals using electron microscopes will want to read this important addition to the literature.

Book Information

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Customer Reviews

"For what it aspires to accomplish, this book succeeds and can be recommended on that basis." --Journal of the American Chemical Society"Provides an outstanding introduction for the Microscopist seeking to make new use of this powerful simulation tool, as well as a great resource for established modelers looking to extend their knowledge. . .clearly written and strongly supported

by practical examples throughout." --Radiation Physics and Chemistry

David C. Joy is at University of Tennessee, Knoxville.

David Joy has penned a lucid and straightforward guide to Monte Carlo modeling of electron scattering. This book benefits from David’s long experience with both TEM and SEM techniques. The books starts off by describing the single scattering model that is appropriate for modeling Monte Carlo scattering in TEM samples--specimens that are necessarily rather thin (usually less than 500 nm thick) so that the electron seldom encounters more than a dozen or so scattering events as it traverses the electron-transparent specimen. The book goes on to assemble the sort of Monte Carlo model needed for simulating electron scattering in thick SEM samples--requiring the introduction of the plural scattering model and the Bethe energy loss equation. A number of special topics relevant to the SEM are treated, including the simulation of EBIC, cathodoluminescence, secondary electron imaging, and x-ray generation. The PASCAL code for many applications are included. The programs are very short and well-explained such that the reader should have no trouble translating them into his computer language of choice. This book should be an easy read for any junior or senior physics major. It is rather remarkable how much David Joy has done with this rather straightforward theoretical technique, both in this book and in his career as an electron microscopist, proving once again that the simplest ideas are often the most useful!

This book provides a good introduction into Monte Carlo simulation for so-called microbeam analysis.I read this book to start up my work on image formation of scanning electron microscopy. This book was really useful to understand how the Monte Carlo technique could be realized in my lap-top.Although the author provides a complete set of PASCAL codes,it was not difficult to convert them into C/C++ based my programming codes.This book contains many references, mainly journal papers.So advanced modificaion may require ones to read these articles.But without this kind of text book,the analysis by Monte Carlo technique would be more difficult.To understand the physical background of electron transport in a specimen,I recommend to read SEM text books by Reimer or by Goldstein et al.

Monte Carlo Modeling for Electron Microscopy and Microanalysis (Oxford Series in Optical and Imaging Sciences) Electron microscopy for beginners: Easy course for understanding and doing electron microscopy (Electron microscopy in Science) Scanning Electron Microscopy, X-Ray

Microanalysis, and Analytical Electron Microscopy: A Laboratory Workbook Transmission Electron Microscopy: Physics of Image Formation and Microanalysis (Springer Series in Optical Sciences,) Scanning Electron Microscopy: Physics of Image Formation and Microanalysis (Springer Series in Optical Sciences) Liquid Cell Electron Microscopy (Advances in Microscopy and Microanalysis) Scanning Electron Microscopy and X-Ray Microanalysis: A Text for Biologists, Materials Scientists, and Geologists Scanning Electron Microscopy and X-ray Microanalysis: Third Edition Scanning Electron Microscopy and X-Ray Microanalysis Handbook of Sample Preparation for Scanning Electron Microscopy and X-Ray Microanalysis Electron Microprobe Analysis and Scanning Electron Microscopy in Geology Electron Diffraction in the Transmission Electron Microscope (Microscopy Handbooks) Computational Materials Science: From Ab Initio to Monte Carlo Methods (Springer Series in Solid-State Sciences) Image Formation in Low-Voltage Scanning Electron Microscopy (SPIE Tutorial Text Vol. TT12) (Tutorial Texts in Optical Engineering) Adaptive Optics for Astronomical Telescopes (Oxford Series in Optical and Imaging Sciences) Optical Thin Films: User's Handbook (Macmillan Series in Optical and Electro-Optical Engineering) 4D Electron Microscopy: Imaging in Space and Time Scanning Transmission Electron Microscopy: Imaging and Analysis Scanning Transmission Electron Microscopy of Nanomaterials : Basics of Imaging and Analysis Scanning Transmission Electron Microscopy of Nanomaterials: Basics of Imaging Analysis