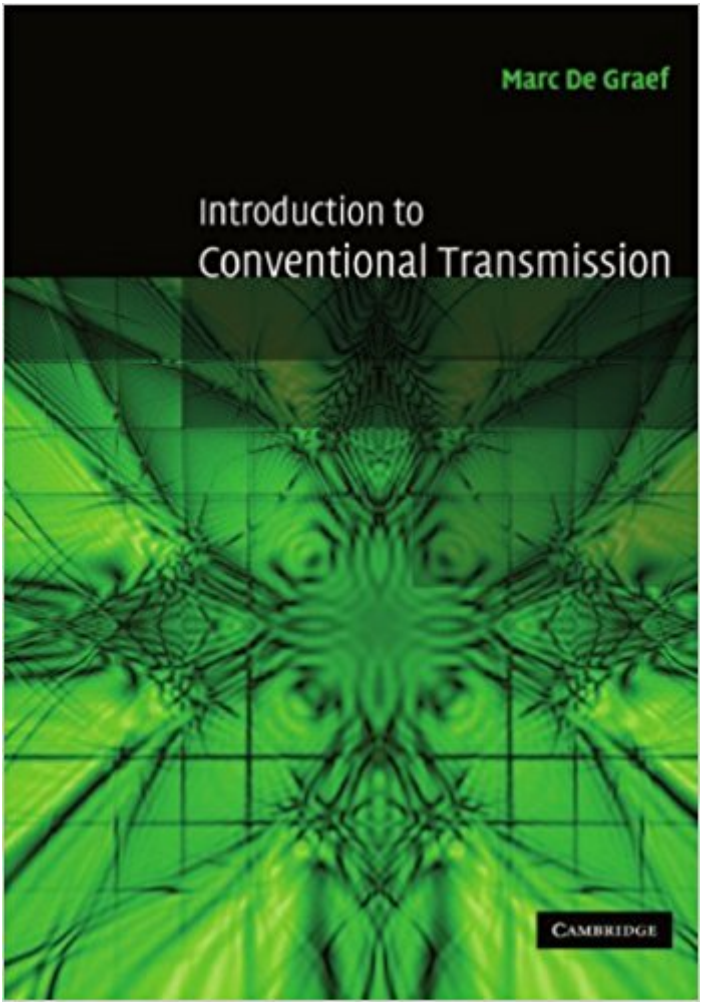
Introduction To Conventional Transmission Electron Microscopy (Cambridge Solid State Science Series)



Synopsis

This book covers the fundamentals of conventional transmission electron microscopy (CTEM) as applied to crystalline solids. In addition to including a large selection of worked examples and homework problems, the volume is accompanied by a supplementary website (http://ctem.web.cmu.edu/) containing interactive modules and over 30,000 lines of free Fortran 90 source code. The work is based on a lecture course given by Marc De Graef in the Department of Materials Science and Engineering at Carnegie Mellon University.

Book Information

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Customer Reviews

'... ideal for students as well as for researchers new to the field.' Materials World'The inner workings of the TEM are described comprehensively, from both a theoretical and practical point of view ... engagingly written ... This book aims to be a practical introduction and guide to TEM and achieves this extremely well.' Materials World'... a clear and extremely well-illustrated do-it-yourself book on conventional TEM of crystals and their defects.' Ultramicroscopy'The introduction to each chapter is engagingly written, generally beginning with some historic or real-world examples before getting into the mathematics behind the machine. This serves to whet the reader's appetite for more information as the chapters lead into well written mathematical theory ... The book aims to be a practical introduction and guide to TEM and achieves this extremely well. Any student who reads this book from cover to cover and follows the examples given will be well on their way to performing useful TEM evaluation.' Materials World

This book covers the fundamentals of conventional transmission electron microscopy (CTEM) as applied to crystalline solids. Complete with over 300 line diagrams and half tones as well as a large selection of worked examples and homework problems; there is also a supplementary website containing interactive modules and free Fortran source code to accompany the text. Based on a lecture course given by the author in the Department of Materials Science and Engineering at Carnegie Mellon University, the book is ideal for graduate students as well researchers new to the field.

For my taste, this book is the best introduction to Transmission Electron Microscopy that I have ever read. It is written at a higher level than Williams and Carter. This book is probably best suited to students with a B.S. in Physics. At the very least one should have benefited from a two semester undergraduate course on Modern Physics (including such things as solving the Schrodinger Equation for the Hydrogen atom) before tackling this book. I wish that a book like this had been out thirty years ago when I started learning TEM! This book does a very good job on two-beam theory and has truly wonderful dispersion surface diagrams.Another excellent aspect of this book is its discussion of the Sturkey scattering matrix approach to modeling electron diffraction. Not only is the scattering matrix approach a good (and from my experience, often better) alternative to the numerical integration of the the Howie Whelan equations for simulating TEM images of extended defects, the author also shows how the scattering matrix approach can be used to derive Cowley-Moodie multislice theory. Indeed, the author’s integration of these two different approaches to simulating TEM images, Howie-Whelan and multislice theory, within the context of the scattering matrix format, is extremely satisfying and illuminating!The author also maintains a website of FORTRAN programs for download corresponding to the simulations described in the textbook. Furthermore, he is very forthcoming in providing guidance in finding the particular program that you are looking for. Even the source code is available for the perusal and use of the interested reader!

I took Prof. de Graef’s class at CMU in 2001, and we used pre-prints of this text. Even in that mostly-finished form, it was excellent. It’s only improved now that I have the finished, published form.Although I found the mathematical formalism that makes up the middle of this book excessive, it is important for people who will be modelling TEM experiments. The remainder of the book, on TEM basics, operation, and image/SADP interpretation, are all excellent.This book is an excellent CTEM text.

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