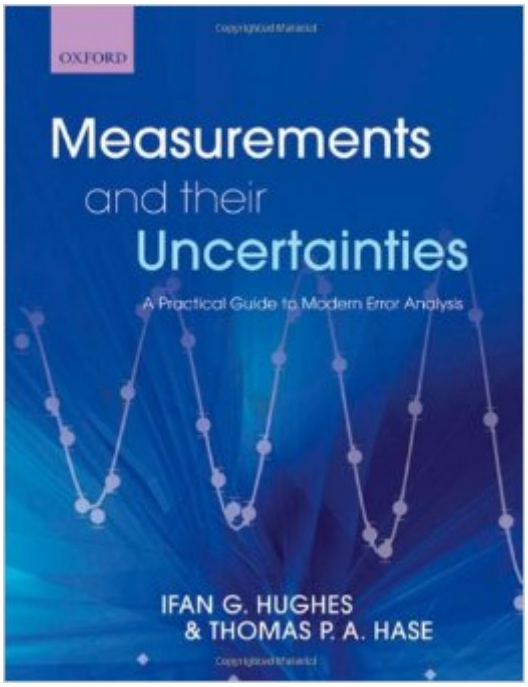
Measurements And Their Uncertainties: A Practical Guide To Modern Error Analysis



Synopsis

This hands-on guide is primarily intended to be used in undergraduate laboratories in the physical sciences and engineering. It assumes no prior knowledge of statistics. It introduces the necessary concepts where needed, with key points illustrated with worked examples and graphic illustrations. In contrast to traditional mathematical treatments it uses a combination of spreadsheet and calculus-based approaches, suitable as a quick and easy on-the-spot reference. The emphasis throughout is on practical strategies to be adopted in the laboratory. Error analysis is introduced at a level accessible to school leavers, and carried through to research level. Error calculation and propagation is presented though a series of rules-of-thumb, look-up tables and approaches amenable to computer analysis. The general approach uses the chi-square statistic extensively. Particular attention is given to hypothesis testing and extraction of parameters and their uncertainties by fitting mathematical models to experimental data. Routines implemented by most contemporary data analysis packages are analysed and explained. The book finishes with a discussion of advanced fitting strategies and an introduction to Bayesian analysis.

Book Information

Paperback: 160 pages

Publisher: Oxford University Press; 1 edition (October 1, 2010)

Language: English

ISBN-10: 019956633X

ISBN-13: 978-0199566334

Product Dimensions: 9.5 x 0.3 x 7.5 inches

Shipping Weight: 12.6 ounces (View shipping rates and policies)

Average Customer Review: 4.2 out of 5 starsÂ Â See all reviewsÂ (8 customer reviews)

Best Sellers Rank: #57,657 in Books (See Top 100 in Books) #5 inÂ Books > Engineering & Transportation > Engineering > Reference > Measurements #18 inÂ Books > Science & Math > Mathematics > Mathematical Analysis #21 inÂ Books > Science & Math > Physics > Mathematical Physics

Customer Reviews

I recently reviewed 10 current books on data and error analysis for undergraduate physics majors, and recommend this one by Hughes and Hase. I was looking for a book that students can read and understand on their own, is concise and easily used as a quick reference, is inexpensive, and follows a relatively modern approach. Hughes and Hase meet these criteria. Their book is written in

an easy to understand style that uses a "visual" approach to explain concepts and derive formulas (using many thumbnail-sized plots in the margins). I also like the topical sequence: Look at real data before delving into probability. The book takes good departures from tradition by only presenting addition of uncertainties in quadrature and by including a computational approach to uncertainty estimation based on spreadsheets. Missing concepts that I would like to see included are GUM (Guide to the Expression of Uncertainty in Measurement) and bootstrapping. This is the shortest (

I have to agree with the other review. The textbook is inexpensive, well written, filled with examples and graphs, and keeps the math derivations to the bare minimum needed. I like it better than Taylor, which is long, and takes forever to get to the point. Hughes will get to the point immediately. Each chapter is fairly short and nice to read. I don’t generally like long chapters for this type of thing, since the concepts are themselves very simple, they should be taught in a simple way, as this book does. There are of course some shortcomings (topics we’d like them to expand on, minor typos), but overall, this is the best book available at this time to teach or learn this kind of material at the undergraduate level.

This book is an excellent introduction to error analysis for 2nd/3nd year undergraduate students in science or technology. To understand the subject as presented in this book with enough depth, some prior knowledge of probablity theory, of descriptive statistics and of 2nd year level calculus are needed.The approach of the first 4 chapters is rather classical. The following chapters about data visualisation and reduction, least square fitting of complex functions, and computer minimalisation and the error matrx, give a good insight in the application of modern computer software in the field of error analysis. Chapter 8, about hypothesis testing, especially in connection with the chi-squared statistic will be rather difficult to follow for students that didn’t follow an introductory statistics course. Though this chapter gives a good summery of the technics used for hypothesis testing by means of the chi-squared distribution. Chapter 9, topics forfurther study, mentions Monte Carlo and bootstrap methods and Bayesian inference, subjects you normally don’t find in introductory courses in error analysis.In short: an excellent book for use in undergraduate studies

This book can be used for a good introduction to uncertainties in measurements on every level of expertise. Would definitely recommend it.

The book is good. I have a PDF version and all the figures and color boxes, conclusions, etc. are

produced using good quality vector graphics.However, the copy I received comes from the Printing Facility in San Bernardino, CA. It looks like a cheap photocopy, printed out with horrible quality. Since there is a lot of detail and math in this book it is necessary even for the text font to be printed in good quality.It looks as if the PDF was converted to JPEG format before printing it out, resulting in pixelated and/or blurry content. The plots, color boxes, and math fonts are the most affected by this.I won't bother returning it because most probably I will get another copy just as bad.I don't want to impact negatively the score of the book, or the reputation of the author. On the contrary, It would be good if the author did something so his work gets to the public the way it is supposed to.

GOOD BOOK

good

This book was exactly as described. It was a course requirement, but I have yet to use it. Have not read any of it.

and Their Architects Modern German Grammar: A Practical Guide (Modern Grammars) Error-Correcting Codes and Finite Fields. Student Edition (Oxford Applied Mathematics and Computing Science Series) Error-Correcting Codes and Finite Fields (Oxford Applied Mathematics and Computing Science Series) Trowel and Error: Over 700 Organic Remedies, Shortcuts, and Tips for the Gardener