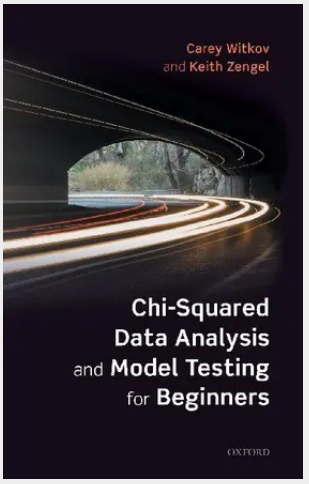
Witkov / Zengel

Chi-Squared Data Analysis and Model Testing for Beginners



Recent groundbreaking discoveries in physics, including the discovery of the Higgs Boson and gravitational waves, have relied on chi-squared analysis and model testing, a data analysis method. This is the first book to make chi-squared model testing accessible to students in introductory physics lab courses and others who need to learn this method, such as beginning researchers in astrophysics and particle physics, beginners in data science, and lab students in other experimental sciences. For over a decade, Harvard University's introductory physics lab sequence has made chi-squared model testing its central theme. Written by two faculty members, the book is based on years of experience teaching students learn how to think like scientists by testing their models using chi-squared analysis. By including uncertainties in the curve fitting technique, chi-squared data analysis improves on the centuries old ordinary least squares and linear regression methods and combines best fit parameter estimation and model testing in one method. A toolkit of essential statistical and experimental concepts is developed from the ground up with novel features to interest even those familiar with the material. The presentation of one and two parameter chi-squared model testing, requiring only elementary probability and algebra, is followed by case studies that apply the methods to simple introductory physics lab experiments. More challenging topics requiring calculus are addressed in an advanced topic chapter. This self-contained and student-friendly introduction includes a glossary, end of chapter problems with complete solutions, and software scripts available in several popular programming languages that the reader can use for chi-squared model testing.

Recent groundbreaking discoveries in physics, including the discovery of the Higgs Boson and gravitational waves, have relied on chi-squared analysis and model testing, a data analysis method. This is the first book to make chi-squared model testing accessible to students in introductory physics lab courses and others who need to learn this method, such as beginning researchers in astrophysics and particle physics, beginners in data science, and lab students in other experimental sciences. For over a decade, Harvard University's introductory physics lab sequence has made chi-squared model testing its central theme. Written by two faculty members, the book is based on years of experience teaching students learn how to think like scientists by testing their models using chi-squared analysis. By including uncertainties in the curve fitting technique, chi-squared data analysis improves on the centuries old ordinary least squares and linear regression methods and combines best fit parameter estimation and model testing in one method. A toolkit of essential statistical and experimental concepts is developed from the ground up with novel features to interest even those familiar with the material. The presentation of one and two parameter chi-squared model testing, requiring only elementary probability and algebra, is followed by case studies that apply the methods to simple introductory physics lab experiments. More challenging topics requiring calculus are addressed in an advanced topic chapter. This self-contained and student-friendly introduction includes a glossary, end of chapter problems with complete solutions, and software scripts available in several popular programming languages that the reader can use for chi-squared model testing.

83,80 €
83,80 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780198847144
Medium: Buch
ISBN: 978-0-19-884714-4
Verlag: OXFORD UNIV PR
Erscheinungstermin: 17.11.2019
Sprache(n): Englisch
Auflage: Erscheinungsjahr 2019
Produktform: Gebunden
Gewicht: 290 g
Seiten: 112
Format (B x H): 161 x 240 mm

Kundenservice Verlag Dr. Otto Schmidt KG
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)