

<<医用物理学实验>>

图书基本信息

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内容概要

The book is written primarily for the first year of pre-medical students. We provide a systematic but brief introduction to the knowledge of measurement data analysis , which includes uncertainty estimation , significant figures and scientific notation. The emphasis of this book is on the training of basic measurements , such as the measurements of length , speed , temperature and voltage , and experimental skills , such as correct recording of data , focusing of a telescope , operation of an oscilloscope , circuit connection , finding the relation between two sets of data , and so on Although most details necessary on the procedures of the experiments are given , this book can not be used as a substitute for carrying out actual experiments. Besides , it is encouraged that students conduct experiments by themselves and carry out data analysis independently , even if , in some cases , cooperation is required The best way to learn from experimental physics is to do it , instead of watching it as a stander-by.

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书籍目录

Introduction to Physics Experiments Introduction to Data Analysis Experiment 1 Measurement of Lengths
Experiment 2 Operation of Dual Trace Oscilloscope Experiment 3 Measurement of Velocity and Acceleration of A
Glider on An Air Track Experiment 4 The Measurement of the Young Modulus of Steel Experiment 5
Measurement of the Speed of An Ultrasonic Wave Experiment 6 Transient and Steady-State Process of RC Circuit
Experiment 7 Experiment on Optical Interference and Newton ring Experiment 8 The Simulation of Electrostatic
Field Experiment 9 Measurement of the Magnetic Field

章节摘录

版权页：插图： Sampling method--the measurements you make must be properly representative of the quantity you are trying to assess. If you were to find the diameter of a steel wire, you should not measure it at one position and orientation. If you are going to take samples from a production line for measurement, do not always take the first ten made on Wednesday afternoon. The environment--temperature, air pressure, humidity and many other conditions might also affect the measuring instrument or the item being measured. Whenever the size and effect of an error are known (e. g. from a calibration certificate), a correction should be applied to the measurement result. However, in general, uncertainties from each of these sources, and from other sources, would be individual 'inputs' contributing to the overall uncertainty in the measurement. Based on the characteristics and the processing method, errors associated with the above mentioned sources of uncertainty can be classified into two categories: systematic error and random error. Systematic error refers to those caused by factors that affect the result in the same way for each of the repeated measurements (but you may not be able to tell). For example, errors associated with the measuring instrument and imported uncertainty mainly belong to this category. Systematic error can not be reduced by increasing the number of repeated measurements. In contrast, random errors are those that take on random values when repeating the measurement, and the uncertainty due to random errors can be reduced by increasing the number of repetition of the measurement. Furthermore, random errors generally tend to distribute in the same way, i. e. , they usually obey normal or Gaussian distribution. You might see this type of distribution if you examine the heights of individuals in a large group of men. Most men are close to average height : few are extremely tall or short. A sketch of normal distribution is shown in Fig. 0. 2. Under normal distribution, errors with small magnitude occur more frequently than those with large magnitude. In addition, the positive errors and negative errors are symmetrically distributed about the center, where error is zero.

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