<<物理和化学中的随机过程>>

图书基本信息

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前言

The interest in fluctuations and in the stochastic methods for describing themhas grown enormously in the last few decades.The number of articles scatteredin the literature of various disciplines must run to thousands， and special journalsare devoted to the subject.Yet the physicist or chemist who wants to becomeacquainted with the field cannot easily find a suitable introduction.He reads theseminal articles of Wang and Uhlenbeck and Of Chandrasekhar.which are almostforty years old， and he culls some useful information from the books ofFeller ， Bharucha.Reid.Stratonovich， and a few others.Apart from that he is confrontedwith a forbidding mass of mathematical literature.much of which is of littlerelevance to his needs.Tllis book is an attempt to fill this gap in the literature.The first part covets the main points of the classical material.Its aim is to provide physicists and chemists with a coherent and sufficiently complete frame-work， in a language that is familiar to them.A thorough intuitive understandingofthe material is held to be a more important tool for research than mathemat-ical rigor and generality.A physical system at best only approximately flulfillsthe mathematical conditions on which rigorous proofs are built， and a physicistshould be constantly aware of the approximate nature of his calculations.（Forinstance.Kolmogorov's derivation of the Fokke卜.Planck equation does not tellhim for which actual systems this equation may be used.）Nor is he interestedin the most generai formulations， but a thorough insight in special cases willenablehimto extendthetheorytoother caseswhentheneed arises.Accordinglythe theory is here developed in close connection with numerous applications andexamples.The second part， starting with chapter IX『now chapter Xl， is concerned wimfluctuations in nonlinear systems.This subject involves a number of conceptualdimculties.first pointed out bv D.K.C.MacDonald.They are of a Phy'sical ratherthan a mathematical nature.Much confusion is caused by the still prevailing viewthat nonlinear fluctuations can be approached from the same physical starting point as linear ones and merely require more elaborate mathematics.In actuaifact.what is needed is a firmer physical basis and a more detailed knowledge ofthe physical system than required for the study oflinear noise.This is the subject of the second part， which has more the character of a monograph and inevitablycontains much of my own work.

内容概要

本书1981年初版，1992年第2版，1997年第2版修订出版，2007年第3版，2008年重印出版。
这是第3版，较第2版的最大不同是，取消了原来第17章中第6节量子主方程的应用，取而代之的是量子波动的介绍；除此之外，本书做了不少修订。
并且也增加了许多最近发展成果。
目次：随机变量；随机事件；随机过程；马尔科夫过程；主方程；一步过程；化学反应；Fokker-Planck过程；Langevin方法；主方程的展开；扩散型；不稳定系统；连续系统中的波动；随机微分方程；量子系统的随机行为。
　　读者对象：数学专业、统计物理专业以及理论物理化学交叉学科的研究生和科研人员。

书籍目录

章节摘录

插图：A "random number" or "stochastic variable" is an object X defined bya. a set of possible values （called "range", "set of states", "sample space"or "phase space"）;b. a probability distribution over this set.Ad a. The set may be discrete, e.g.: heads or tails; the number of electronsin the conduction band of a semiconductor; the number of molecules of acertain component in a reacting mixture. Or the set may be continuous in agiven interval: one velocity component of a Brownian particle （interval-∞+∞）; the kinetic energy of that particle （0,∞）; the potential differencebetween the end points of an electrical resistance （-∞, +∞）. Finally the setmay be partly discrete, partly continuous, e.g., the energy of an electron inthe presence of binding centers. Moreover the set of states may be multidimen-sional; in this case X is often conveniently written as a vector X. Examples:X may stand for the three velocity components of a Brownian particle; orfor the collection of all numbers of molecules of the various components ina reacting mixture; or the numbers of electrons trapped in the various speciesof impurities in a semiconductor.For simplicity we shall often use the notation for discrete states or for acontinuous one-dimensional range and leave it to the reader to adapt thenotation to other cases.

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