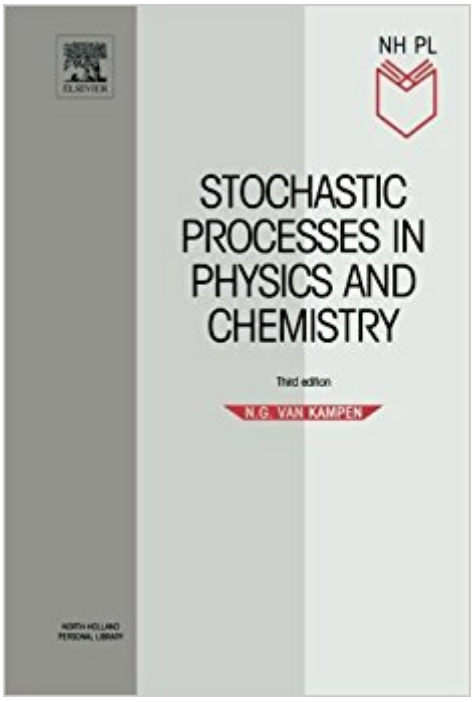
Stochastic Processes In Physics And Chemistry, Third Edition (North-Holland Personal Library)



Synopsis

The third edition of Van Kampen’s standard work has been revised and updated. The main difference with the second edition is that the contrived application of the quantum master equation in section 6 of chapter XVII has been replaced with a satisfactory treatment of quantum fluctuations. Apart from that throughout the text corrections have been made and a number of references to later developments have been included. From the recent textbooks the following are the most relevant. C.W.Gardiner, Quantum Optics (Springer, Berlin 1991)D.T. Gillespie, Markov Processes (Academic Press, San Diego 1992)W.T. Coffey, Yu.P.Kalmykov, and J.T.Waldron, The Langevin Equation (2nd edition, World Scientific, 2004) * Comprehensive coverage of fluctuations and stochastic methods for describing them* A must for students and researchers in applied mathematics, physics and physical chemistry

Book Information

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Customer Reviews

This is my favorite textbook. It is highly readable; everything is explained very clearly without being verbose, and it is very logically organized. One of the book’s best features is the author’s commentary on the inappropriate uses of particular approaches or the care needed in working particular problems correctly. These insightful sections are clearly the result of a true mastery of the subject and make easier the use of the book for self-study, in which access to such commentary (from a lecturer) is typically not available.Although it doesn’t read like it, this book is actually quite

dense with information. It is not uncommon for me to come across a difficult problem in my work, only to find it solved in here. There are many exercises, all of which are interesting and add to the presentation in each chapter.I do not have any complaints about this book, and I can not recommend any other book more highly than this for anyone interested in learning more about stochastic processes. Even as a first book on the subject, for readers with sufficient mathematical sophistication I can not think of a better book.A final note: the changes to the third edition are apparently mostly in the chapter on quantum mechanics. You might consider trying to find a bargain on the second edition if such changes are not important to you!

Before I knew of this book, I used to refer to Chandrasekhar's paper on stochastic processes. This book is very physical and tries to avoid unnecessary dry mathematical rigour (replacing it with clear physical insights) Also the physical problems considered in the book to elucidate the mathematical framework vary from fundamental physics to applications. The exercises are essential but otherwise also the book is a smooth reader. The sections on master equation, Focker plank equation and fluctuation dissipation are my favourites.I used to work in systems biology and now I have changed my focus to biophysics and the book is useful to me still. I was so desperate to get the book that I had to buy it second hand at the price of first hand. I do not regret about that at all.RegardsPurushottamJHU Chemical Engineering,Grad student

Van Kampen's book is a must-have for anyone interested in stochastic processes. The presentation is masterful and there are numerous thought-provoking examples and exercises. The author's remarks on "abuse" of methods (such as the Langevin technique) are well worth understanding, even if one does not agree with him in all cases. The price is a bit steep which is unfortunate since this book is really ideal for advanced undergraduates and graduate students.

I only recently discovered this text sitting on the desk of a fellow in the lab. It is, in my opinion, the most useful treatment of the subject that is available. This book is clearly written, very close to self-contained, and in covers the field in great depth. The discussions wonderfully provide a big-picture vision to compliment the technical details.I dug into the book with one of the later chapters on the Langevin equation, specifically curious to learn about strategies for connecting a Langevin-equation based simulation back to the formalism of the chemical master equation. I quickly realized that I had better start somewhere closer to the beginning to become better grounded in the notations used and also some basic concepts. I am glad I did, because the exercise

has greatly strengthened my grounding in the field.My only complaint is that the number of typographical errors is relatively high for a third edition. The careful reader will have no problems. However, I recommend being careful in using the book as a casual reference.

Van Kampen is that rare book that has enormous utility while being very clear and readable. It is perfectly suitable for sitting down and reading; the ideas flow together in a seamless way. Yet if you need to use it as a reference, you can flip to the appropriate page and the ideas will still be clear! It's amazing to me how Van Kampen manages to have the topics of the book stand alone, yet be woven together in such a logical, and even pedagogical, way.This book is recommended for anyone working in statistical physics and is a must for anyone studying nonequilibrium phenomena in chemisty or physics. Even moreso than Kubo's excellent book on nonequilbrium statistical mechanics, this is the most clear and complete volume.

The literature of stochastic processes is vast. However, little of that written for mathematicianstackles the kind of problem solving which is necessary in physics and in physical chemistry. Mathematicians are strongly interested in questions of existence etc., whereas physical scientistswant solutions, approximate if need be, and assume that a physically well-posedproblem will lead to a mathematically well posed one.Hence little of the mathematical literature on stochasticprocesses is of much use to physicists.Again, there is a considerable literature on Gaussian processes, in particular in the engineeringliterature, and a substantial literature on ARIMA-style modelling.If one's problem involves Gaussian processes, it might very well have been solved already. For therest, ... there is van Kampen's monograph, and not much else. It is interesting, with manydifficult problems solved in it, as the other reviewers note. Even if the field were crowded withexcellent physically-relevant books, this book would stand out. As it is, it is the one essentialreference for stochastic problems in physics and chemistry. So I have found, at any rate.Disclaimer: I know, and am on friendly terms with, the author.

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