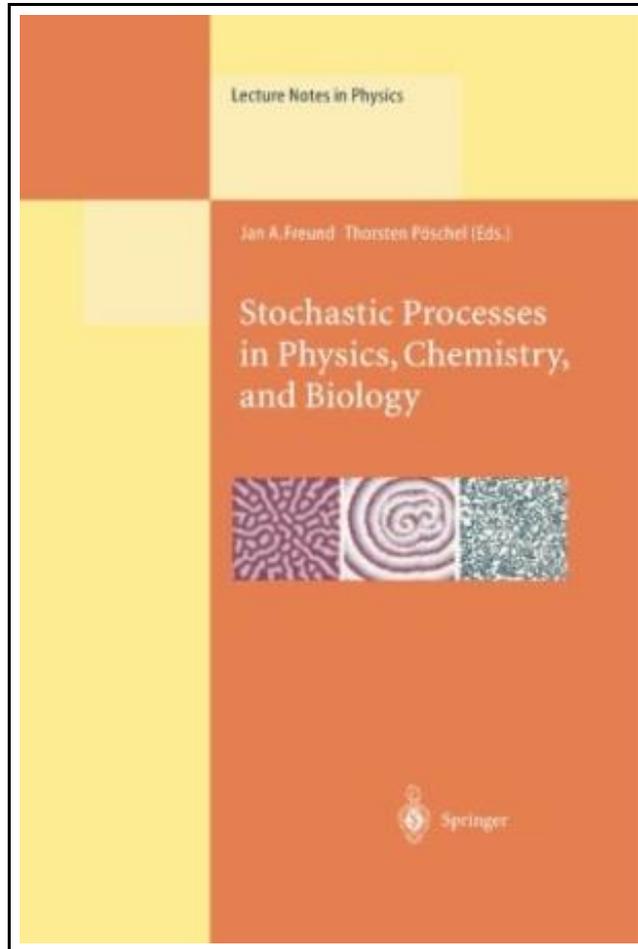


Stochastic Processes in Physics, Chemistry, and Biology



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(Ms. Ora Buckridge)

STOCHASTIC PROCESSES IN PHYSICS, CHEMISTRY, AND BIOLOGY



Book Condition: New. Publisher/Verlag: Springer, Berlin | The theory of stochastic processes originally grew out of efforts to describe Brownian motion quantitatively. Today it provides a huge arsenal of methods suitable for analyzing the influence of noise on a wide range of systems. The credit for acquiring all the deep insights and powerful methods is due mainly to a handful of physicists and mathematicians: Einstein, Smoluchowski, Langevin, Wiener, Stratonovich, etc. Hence it is no surprise that until recently the bulk of basic and applied stochastic research was devoted to purely mathematical and physical questions. However, in the last decade we have witnessed an enormous growth of results achieved in other sciences - especially chemistry and biology - based on applying methods of stochastic processes. One reason for this stochastics boom may be that the realization that noise plays a constructive rather than the expected deteriorating role has spread to communities beyond physics. Besides their aesthetic appeal these noise-induced, noise-supported or noise-enhanced effects sometimes offer an explanation for so far open problems (information transmission in the nervous system and information processing in the brain, processes at the cell level, enzymatic reactions, etc.). They may also pave the way to novel technological applications (noise-enhanced reaction rates, noise-induced transport and separation on the nanoscale, etc.). Key words to be mentioned in this context are stochastic resonance, Brownian motors or ratchets, and noise-supported phenomena in excitable systems. | Stochastic Transport and Brownian Motion.- Directed Current Without Dissipation: Reincarnation of a Maxwell-Loschmidt Demon.- Molecular Motors and Stochastic Models.- Nonlinearly Coupled Chemical Reactions.- Thermodynamics of Isothermal Brownian Motors.- Rocking Ratchets at High Frequencies.- Defect Dragging in Periodic Structures.- Conduction in an Inhomogeneous Medium.- Theory and Control of Multiple Hopping in Activated Surface Diffusion.- Brownian Motion in a d-Dimensional Space...



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