The Langevin Equation:With Applications to Stochastic Problems in Physics, Chemistry and Electrical Engineering: 27 (World Scientific Series in Contemporary Chemical Physics)

William T Coffey, Yuri P Kalmykov

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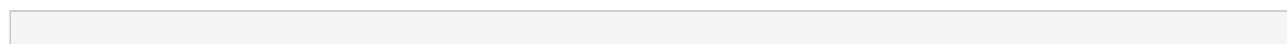**The Langevin Equation:With Applications to Stochastic Problems in Physics, Chemistry and Electrical Engineering: 27 (World Scientific Series in Contemporary Chemical Physics)** William T Coffey, Yuri P Kalmykov

This volume is the third edition of the first-ever elementary book on the Langevin equation method for the solution of problems involving the translational and rotational Brownian motion of particles and spins in a potential highlighting modern applications in physics, chemistry, electrical engineering, and so on. In order to improve the presentation, to accommodate all the new developments, and to appeal to the specialized interests of the various communities involved, the book has been extensively rewritten and a very large amount of new material has been added. This has been done in order to present a comprehensive overview of the subject emphasizing via a synergetic approach that seemingly unrelated physical problems involving random noise may be described using virtually identical mathematical methods in the spirit of the founders of the subject, viz., Einstein, Langevin, Smoluchowski, Kramers, etc. The book has been written in such a way that all the material should be accessible both to an advanced researcher and a beginning graduate student. It draws together, in a coherent fashion, a variety of results which have hitherto been available only in the form of scattered research papers and review articles.

Contents:

- Historical Background and Introductory Concepts
- Langevin Equations and Methods of Solution
- Brownian Motion of a Free Particle and a Harmonic Oscillator
- Rotational Brownian Motion About a Fixed Axis in N-Fold Cosine Potentials
- Brownian Motion in a Tilted Periodic Potential: Application to the Josephson Tunnelling Junction
- Translational Brownian Motion in a Double-Well Potential
- Non-inertial Rotational Diffusion in Axially Symmetric External Potentials: Applications to Orientational Relaxation of Molecules in Fluids and Liquid Crystals
- Anisotropic Non-inertial Rotational Diffusion in an External Potential: Application to Linear and Nonlinear Dielectric Relaxation and the Dynamic Kerr Effect
- Brownian Motion of Classical Spins: Application to Magnetization Relaxation in Superparamagnets
- Inertial Effects in Rotational and Translational Brownian Motion for a Single Degree of Freedom
- Inertial Effects in Rotational Diffusion in Space: Application to Orientational Relaxation in Molecular Liquids and Ferrofluids
- Anomalous Diffusion and Relaxation

Readership: Advanced undergraduates, postgraduates, academics and researchers in statistical physics, condensed matter physics and magnetism, chemical physics, theoretical chemistry and applied mathematics.

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