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Nota di contenuto	Statistical Microhydrodynamics; Contents; Preface; Nomenclature; 1 Basic Concepts of the Probability Theory; 1.1 Events, Set of Events, and Probability; 1.2 Random Variables, Probability Distribution Function, Average Value, and Variance; 1.3 Generalized Functions; 1.4 Methods of Averaging; 1.5 Characteristic Functions; 1.6 Moments and Cumulants of Random Variables; 1.7 Correlation Functions; 1.8 Bernoulli, Poisson, and Gaussian Distributions; 1.9 Stationary Random Functions, Homogeneous Random Fields; 1.10 Isotropic Random Fields. Spectral Representation 1.11 Stochastic Processes. Markovian Processes. The Chapman-Kolmogorov Integral Equation1.12 The Chapman-Kolmogorov, Chapman-Feller, Fokker-Planck, and Liouville Differential Equations; 1.12.1 Derivation of the Differential Chapman-Kolmogorov Equation; 1.12.2 Discontinuous (""Jump"") Processes. The Kolmogorov-Feller Equation; 1.12.3 Diffusion Processes. The Fokker-Planck Equation; 1.12.4 Deterministic Processes. The Liouville Equation; 1.13 Stochastic Differential Equations. The Langevin Equation; 1.13.1 The Langevin

Equation; 1.13.2 The Diffusion Equation
1.13.2.1 The Diffusion Equation with Chemical Reactions Taken into Account1.13.2.2 Brownian Motion of a Particle in a Hydrodynamic Medium; 1.14 Variational (Functional) Derivatives; 1.15 The Characteristic Functional; 2 Elements of Microhydrodynamics; 2.1 Motion of an Isolated Particle in a Quiescent Fluid; 2.2 Motion of an Isolated Particle in a Moving Fluid; 2.3 Motion of Two Particles in a Fluid; 2.3.1 Fluid is at Rest at the Infinity (v = 0); 2.3.2 Fluid is Moving at the Infinity (v 0); 2.4 Multi-Particle Motion; 2.5 Flow of a Fluid Through a Random Bed of Particles
3 Brownian Motion of Particles3.1 Random Walk of an Isolated Particle; 3.1.1 Isotropic Distribution; 3.1.2 Gaussian Distribution; 3.1.3 An Arbitrary Distribution (r) in the Limiting Case N»1; 3.2 Random Walk of an Ensemble of Particles; 3.3 Brownian Motion of a Free Particle in a Quiescent Fluid; 3.4 Brownian Motion of a Particle in an External Force Field; 3.5 The Smoluchowski Equation; 3.6 Brownian Motion of a Particle in a Moving Fluid; 3.7 Brownian Diffusion with Hydrodynamic Interactions; 3.8 Brownian Diffusion with Hydrodynamic Interactions and External Forces
3.8.1 High Peclet Numbers: Pe(ij)»13.8.2 Small Peclet Numbers, Pe(ij)«1; 3.9 Particle Sedimentation in a Monodisperse Dilute Suspension; 3.10 Particle Sedimentation in a Polydisperse Dilute Suspension, with Hydrodynamic and Molecular Interactions and Brownian Motion of Particles; 3.11 Transport Coefficients in Disperse Media; 3.11.1 Infinitely Dilute Suspension with Non-interacting Particles; 3.11.2 The Influence of Particle Interactions on Transport Coefficients; 3.12 Concentrated Disperse Media; 4 Turbulent Flow of Fluids; 4.1 General Information on Laminar and Turbulent Flows
4.2 The Momentum Equation for Viscous Incompressible Fluids

Sommario/riassunto

Written by experienced practitioners and teachers, this concise and comprehensive treatment on particulate flow covers both the theory as well as applications and examples from the oil and chemical industry. Following a look at the basic concepts of probability theory, the authors goe on to examine the elements of microhydrodynamics, Brownian motion, and real liquids in turbulent flow.Of interest for lecturers in physics, theoretical physicists and chemists, as well as chemical engineers.