voted primarily to electrophoresis and electrophoretic separations, although there is a short section on sedimentation and streaming potentials. Here, the treatment of the problem of electrophoretic motion of a sphere in the limit of small double layers has been modified from the first edition, in which Smoluchowski's equation was derived without sufficient explanation. The modified derivation is a definite improvement over the original, although it is still less complete than those found elsewhere (for example, *Colloidal Dispersions* by W. B. Russel, D. A. Saville, and W. R. Schowalter, Cambridge University Press, 1989).

In Chapters 8, 9 and 10, the topics of suspension stability, rheology and surface tension are covered, respectively. Chapter 8 begins with an overview of DLVO theory, which is followed by a discussion of Smoluchowski's theory for collision rates in colloidal suspensions. The remainder of the chapter focuses on particle capture and filtration. Chapter 9, "Rheology and Concentrated Suspensions," is new and was written for the second edition. Of the four sections of this chapter, the first two deal with rheology generally, and the latter two with the particular rheology of monomodal- and bimodal-concentrated suspensions in the limit of high shear. Obviously, when covering topics as broad as these in one short chapter, only some of the most basic concepts and definitions can be included, and the comments above pertaining to the introductory nature of the text are once again applicable. Definitions of the shear-rate-dependent viscosity and the first and second normal stress differences are provided, along with the well-known Bingham and power-law models of generalized Newtonian fluids. There is also an informative discussion of the importance of relaxation times in the flow of polymer liquids. The sections on concentrated suspensions focus on the more influential of the many semiempirical models that are available for the high shear viscosity of those systems. Efforts to calculate the viscosity by rigorous theories and simulations are not discussed. Shear-induced migration, currently of great interest to the fluid mechanics community, is mentioned briefly but is not discussed. The final chapter, Chapter 10, covers several classic examples of the interaction between surface tension and fluid flow. These include capillary rise in tubes, dip coating, Raleigh's analysis of jet breakup, and thermocapillary migration in a shallow pan. The final section, which is new to the second edition, is a good discussion of buoyancy and Marangoni effects in the formation of hexagonal Bénard cells.

The wide variety of problems treated by the unified theoretical framework presented in this book make it a pleasure to read. Although the coverage could in places benefit from additional depth, it is thorough enough to identify the underlying physics governing many problems of physicochemical hydrodynamics. In addition, in most chapters there is a nice blend of fundamental scientific principles along with their application in analytic methods and in process operations. As an introductory text, this book should therefore be very useful to students in physical chemistry, chemical and mechanical engineering.

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Schrodinger Equations and Diffusion Theory

By Masao Nagasawa, Birkhauser Verlag, Berlin, 1993, 319 pp., $99.00.

This is a highly mathematical book that discusses in depth the equivalence between diffusion processes and Schrodinger's quantum mechanics. It is a desirable reference book for those interested in stochastic processes. Among chemical engineers, the book's audience will be limited to theorists and computer simulation experts who are interested in stochastic processes. This, however, does not imply that the book is not of relevance to the study of many problems of interest to chemical engineers. Transport of species through polymer membranes, acidic zeolites and other micro/mesoporous media, ion transport through solid polymer electrolytes used in lightweight batteries, nutrient transport in biological systems, and turbulent flows are examples of quintessential chemical engineering applications wherein an understanding of stochastic processes is important. This book does not discuss practical ways of analyzing these problems. It does, however, provide deep insight into the theoretical framework that underlies useful descriptions of these processes. Thus, the book will be of value to theorists and computer simulators.

The main benefit of this book for applied scientists stems from the comprehensive discussion of the many subtle issues associated with the equivalence between "imaginary time quantum mechanics" and diffusion processes. I particularly enjoyed Chapters 2–4 which contain beautiful (but mathematical) discussions of many important topics that include the Feynman-Kac formula, Kolmogoroff's representation, and the equivalence theorem. Chapter 6 also contains a good discussion of Feynman path integrals and how one defines a measure in this context. This discussion may also be of some use to polymer theorists.

The author's intended audience is probably not the applied science community. Even so, I believe that the book would be more beneficial to the engineering, physics and chemistry communities if more references to work were included, in which the underlying ideas discussed in the book are employed to study physical phenomena. An example would be the work on diffusion in disordered media that has revealed interesting physics of direct relevance to practical applications. In a similar vein, the book would have a wider audience if it contained some discussion of how to cast diffusion processes (and quantum mechanics) as field theories, because field-theoretic descriptions of diffusion processes can explore many phenomena of interest to the science and applied science communities. Except for the example on septation of *E-coli*, applied scientists will not find the examples in Chapter 9 very useful. My criticism of the book in this paragraph is perhaps somewhat unjustified since the author's intended audience probably included only the mathematics and applied mathematics communities.

In spite of its somewhat narrow focus, this book is an important addition to the literature on theory of stochastic processes. It will prove to be useful for theorists engaged in understanding various aspects of condensed matter phenomena that are of practical importance. I would recommend it highly to this community.

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