(c) Those unfamiliar with the field will get confused with the words sliding and slipping (and derivatives). They are used interchangeably. Rheologists refer to slip as a phenomenon adjacent to a solid boundary. This type of slip does occur in ehd lubrication but Jacobson sometimes calls it sliding, which is better reserved for the velocity difference of the two solid surfaces in contact, which Jacobson sometimes calls slip.

(d) There are some unusual spellings consistently used, e.g. excentric, tixotropic, rheopexic, toluole, glycole, naphtenic.

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Microhydrodynamics: Principles and Selected Applications, by S. Kim and S.J. Karrila, Butterworth–Henemann, Boston, 1991, 507 pp. Price: £45.00.

In microrheological modeling one often has to deal with concepts of general fluid mechanics, and in particular with the treatment of low-Reynolds-number flows. Although some excellent textbooks and a number of well-known review papers on these subjects are already available in the literature, the field is still difficult to enter. There still exists an obvious lack of a broad and coherent treatment of the whole subject of "Microhydrodynamics".

One of the aims of the book of Kim and Karrila is to provide such a treatment of the subject, ranging from an introduction to the fundamental equations, via the treatment of single particle dynamics and many particle problems with hydrodynamic interactions to the application of parallel computational methods. A book covering such a broad field could easily become superfluous or confusing by the immense amount and the complexity of the material. The authors however have succeeded in circumventing this by a careful selection of the material—instead of attempting to provide a complete review of the various subjects, emphasis has been given to a coherent treatment of carefully selected parts—and by the very clear organization scheme of the book as a whole, and also of all its parts. Even in complicated subjects, like resistance and mobility relations and various types of hydrodynamic interaction between particles the reader will not easily lose his overall view, because of the adequate organization of the material. Moreover the style is very clear and direct; this will certainly be appreciated by the reader in the discussion of the many complicated concepts and derivations.

The book is subdivided in four parts:

Part I offers an introduction to the general properties of the Stokes equation, including some fundamental theorems on minimum energy dissipation and the Lorentz reciprocal theorem. The clear treatment of multipoles like stresslets, Stokeslets rotlets etc. will be appreciated by readers with a rheological background.

Part II deals with the dynamics of a simple particle. Here the multipole expansions are derived for simple shaped particles, like spheres and ellipsoids. Emphasis is placed on the link between these singular solutions and the Faxén laws. The general solution of the Stokes equation by Lamb is discussed and the connection with the multipole expansion is brought out. A chapter which certainly will be of interest for rheologists in chapter 5 on resistance and mobility relations. These relations form the basis of the expressions for the stresslet from which by ensemble averaging the expression of the stress tensor in a dilute dispersion is derived. Even those who are already familiar with this subject will appreciate the clear treatment given here. They, like myself, will probably regret that no more space could be reserved in the book for sections like this, but will admit that microrheology is not the main subject of the book. Part II concludes with a treatment of transient Stokes flow.

Part III on hydrodynamic interactions starts with a general treatment of resistance and mobility relations between particles. The material is divided according to the separation of particles: two-sphere resistance and mobility, particle near contact, large and small particles and particle–wall interactions. Analytical as well as numerical methods are discussed in sufficient detail. The interested reader will appreciate the many tables with explicit data on resistance functions, mobility functions and other basic properties. Rheologists will appreciate the clear discussion in chapter 8 of the classical paradox (Bachelor and Green, 1972) of nonconvergent integrals in the $O(c^2)$ treatment of dilute dispersions in terms of renormalisation theory.

The final part (IV) of the book deals with a rather new subject: the foundations of parallel computation methods. Emphasis is placed on the so called "boundary integral methods", which are based upon bringing the Stokes singularities to the particle surface, in favor of spatial methods, such as finite elements and finite differences. The method is extended to a new boundary integral method, the "Complete Double Layer Boundary Integral Equation Method (CDL-BIEM)" which has the advantage that it has a nearest neighbor character. This makes it suitable for parallel computation. This part contains an interesting introduction to integral operators and the subject of ill and well posedness in relation to numerical methods. Finally, some examples of mobility and resistance calculations for one- two- and three- sphere problems, the sedimentation of regular polyhedra and the

multiparticle problem are discussed. Attention is given to a comparison with other numerical methods and with experimental data and also to the implementation of the methods to parallel computers.

My overall impression of the book is definitely positive. The book is undoubtedly useful for researchers in microrheology. It provides a lot of information which is rather difficult to obtain from primary sources in a coherent, clear and well organized way. The exercises, included in each chapter, are well selected and presented with sufficient information for the interested reader. This, in combination with the qualities mentioned above also makes the book a useful textbook. Beside its contents, there are many indications that the book is a product of this electronic age. A pleasant aspect of this is the facility to the reader to download the listings of the computer programs, discussed in the book. A drawback is that some of the figures, which are clearly the product of computer graphics, are of a quality which is out of character with the high standard set by the rest of the book. This of course is of minor importance and I am happy to recommend this remarkable book to the readers of the Journal of Non-Newtonian Fluid Mechanics.

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