SUGGESTED REFERENCES: Chapter 4

R. R. STOLL, *Linear Algebra and Matrix Theory.* The textbook literature on linear algebra is voluminous, evanescent, and largely unusable for present purposes. For the reference given here a deliberate choice was made of one with a somewhat old-fashioned and leisurely approach, displaying a penchant for Euclidean spaces and frequent three-dimensional examples. The physics in the present chapter demands no higher level of mathematical development.

G. ARFKEN, *Mathematical Methods for Physicists.* Texts with titles such as this usually have some treatment of matrices and linear transformations, and Arfken's book is representative of the best of these. Chapter 4 on matrices and determinants is particularly relevant and has a collection of useful problems. Pauli matrices are discussed here, along with their four-dimensional generalizations, the Dirac matrices.

H. JEEFREYS and **B. S. JEFEREYS,** *Methods of Mathematical Physics.* Though a rather aging text by now, this reference contains a wealth of physical applications born out of the authors' long research experience in theoretical physics. Many of the topics of the present chapter will be found discussed in Chapters 3 and 4, including a treatment of the Pauli spin matrices and their connection with the three-dimensional rotation matrices. The section on Euler angles is practically unintelligible, not solely because of a poor diagram. The apt and witty quotations heading each chapter are alone almost the worth of the price of admission. What's given for Chapter 7 is probably a misquotation but is all the more bitingly humorous for that.

J. B. MARION. *Principles of Vector Analysis.* Although this is but a pocket size paperback the author goes into extensive detail on the properties of the orthogonal transformation matrix and the transformation properties of axial and polar vectors. Here and in later sections, considerable use is made of the permutation symbol, e.g., in derivation of complicated vector identities.

J. L. SYNGE and **A. SCHILD,** *Tensor Calculus.* This well-known monograph ranges widely over many aspects of tensors including a few of special interest here. Section 4.2 grudgingly considers properties of tensors in flat space (we will be considering only flat space in this book), especially those of the permutation symbol. Chapter 7 considers relative tensors or pseudotensors, which are the tensor generalizations of pseudovectors. Two chapters consider physical applications, including dynamics, from a somewhat unusual viewpoint.

E. T. WHITTAKER, *Analytical Dynamics.* Chapter I contains the material pertinent to our purposes. The section on Eulerian angles is difficult to follow because of the lack of *any* diagram. Reference should be made to our footnote in Section *4-5* (See Appendix A of the 3rd edition) in comparing his results with our equations. Section 12 discusses the relation of the Cayley-Klein parameters to the so-called homographic transformation.

L. A. PARS, *A Treatise on Analytical Dynamics.* A monumental treatise indeed, this looks and feels like a modern day successor to Whittaker, in full scholarly Cambridge tradition. It is a book that, as it were, seems to wear cap and gown, and like Whittaker displays a wealth of erudition. Chapter VIII is devoted to the theory of rotations and contains, among many other items, three separate proofs of the rotation formula. The strong version of Chasles' theorem (see above, footnote p. 163) is given a simple geometric proof that would not be out of place in Newton's *Principia.*

G. HAMEL, *Theoretische Mechanik.* Those to whom the language is accessible will find that this reference contains an almost complete encyclopedia of information on the kinematics of rigid rotation, primarily in Sections 8 and 9 of Chapter 2. Examples are a thorough discussion of the relation of the stereographic projection to the Cayley-Klein and Euler parameters, and of the quaternion representation of rotation. The world of physics in which the treatment is imbedded is roughly that of 1925. The book is concluded by a 260 page section of exercises *and* their solutions.

T. C. BRADBURY, *Theoretical Mechanics.* Although labeled as an intermediate level text, many items of interest here are covered, some from rather unusual viewpoints. Chapters 1 and 3 cover much the same ground as here on matrices, but somewhat more intensively. The properties of the permutation symbol are discussed explicitly. For motion in a rotating system an effective Lagrangian is set up in which the Coriolis force is derived from a velocity-dependent potential, introduced in something of an adhoc manner. It does provide an efficient tool for the study of motion in such noninertial frames.