28[17-01, 17-04, 22-01].—JOHAN G. F. BELINFANTE & BERNARD KOLMAN, *A Survey of Lie Groups and Lie Algebras with Applications and Computational Methods*, Classics in Applied Mathematics, Vol. 2, SIAM, Philadelphia, PA, 1989, x + 164 pp., 23 cm. Price $24.50 paperback.

The book under review is the second edition of a text which appeared first as book in 1972 and which is an expanded version of three review papers which appeared in the mid-sixties. It has now appeared as volume 2 of a series with the promising title "Classics in Applied Mathematics". The book consists of three chapters, entitled Lie groups and Lie algebras, Representation theory, Constructive methods, and an extensive bibliography of pre-1972 references.

In the first two chapters the authors explain the notions of Lie groups and Lie algebras and their basic properties. All proofs are omitted. Instead, extensive references are given. As an example of the narrative style we quote the definition of a Lie algebra: "*Abstractly, a Lie algebra L is a vector space equipped with a product $[x, y]$ satisfying certain axioms* (references to Freudenthal-de Vries, Dynkin, Jacobson and van der Waerden). *We shall continue to use the bracket notation for products when we deal with any Lie algebra. One of the axioms for a Lie algebra is that the product $[x, y]$ be bilinear, that is, linear in x and y separately. We also assume that the Lie product is anticommutative, $[x, y] = -[y, x]$. Finally we assume that the Jacobi identity, $[x, [y, z]] + [y, [z, x]] + [z, [x, y]] = 0$, holds for all vectors x, y, z in the Lie algebra.*" As examples, the applications of Lie groups and algebras in classical and quantum mechanics are described in a few pages. The description of classical mechanics looks incomprehensible for readers without a background in physics. Such a background is not necessary to understand that the basic definitions of pure states and transition probabilities in the section on quantum symmetries are wrong.

The third chapter focusses on the calculation of weight multiplicities of irreducible highest weight representations and the decomposition of tensor products. This chapter is without doubt the most interesting. Physicists and applied mathematicians will find here the basic ideas behind the tables and the computer algebra packages which they use for their calculations.

Many books have been written on Lie groups and algebras. Some are called "Classics". The omission of the beautiful proofs of, e.g., the Weyl character formula, and the sloppy treatment of applications, suggest that this book hardly deserves this title. The third chapter, however, is still well worth reading for everyone who occasionally uses Lie algebra representations.

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