BOOK REVIEWS

BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 18, Number 2, April 1988

0273-0979/88 $1.00 + $.25 per page

Malcev-admissible algebras, by Hyo Chul Myung. Progress in Mathematics, vol. 64, Birkhäuser, Boston, Basel, Stuttgart, 1986, xvi + 353 pp., $55.00. ISBN 0-8176-3345-6

In both art and science, the specialists in any subject find it necessary to establish a set of rules or formalisms to allow a good understanding of that subject to be developed. When a subject is well enough understood in terms of one set of rules, the deficiencies of that set of rules become apparent, and a new, frequently more general, set of rules or formalism is developed.

One of the areas where we are all aware of this process is in physics, where quantum theory followed Newtonian mechanics, and has in turn been added to and amended by a series of later theories. In this progression, increasingly sophisticated mathematics has been used, including much algebra. Lie groups and Lie algebras have become staples, and many other nonassociative algebras, including the octonions, have been used by different theoretical physicists. When Lie groups were first introduced into physics, they represented the symmetries or automorphisms of the physical systems that they were associated with, and the corresponding Lie algebras were used because they were easier to work with than the groups. Over a period of time, the relation between the physical system being investigated and the associated algebra has become more intimate. Today, if an algebra is associated with a physical system, and if the formalism allows a physicist to deduce useful information about the physical system from the associated algebra without completely solving the dynamical problems, then the algebra is fulfilling its role.

If one wants to construct a generalization of a physical theory, one natural way is to pick a generalization of the associated algebra, and to try to use appropriate formalism to derive a more general physical theory. It is just such an attempt which provides the motivation for the book *Malcev-admissible algebras* by Hyo Chul Myung. The physicist Ruggero Maria Santilli conceived the need to generalize the Lie algebras associated with certain physical theories to Lie-admissible algebras (definitions will be given shortly). In Santilli's words [**9**, p. 3], "Newtonian systems with forces not derivable from a potential can be represented with Hamilton's equations with external terms. As we shall see, the generalized brackets of the time evolution law induced by these broader equations violate the Lie algebra laws. But, when properly written, they characterize precisely a general Lie-admissible algebra. In particular, under certain restrictions, these generalized brackets characterize the subclass of flexible