

*On a Special Polyadic of Order  $n-p$  which can be Derived from any  $p$  Independent Vectors in an  $n$ -Dimensional Space and which can be Regarded as a Generalization of the Vector Product.* By Almar Naess. (Videnskapsselskapets Skrifter, I. Mat.-Naturw. Klasse, 1922, No. 13.) Kristiania, Jacob Dybwad, 1923. 53 pp.

This beautifully printed pamphlet of 53 pages is an important contribution to generalized vector algebra. It deals with the "space-complement" of a set of  $p$  vectors, proved invariant under orthogonal transformation, and distributive, i. e. the space-complement of a sum of polyadics is the sum of the space-complements of the terms. The space-complement of the space-complement of  $p$  vectors is their alternant product, a fact whose importance in the logic of the subject can hardly be overestimated, — e. g. in 3-space the space-complement of two vectors is their vector product, while their alternant product is a skew-symmetric tensor often confounded with the vector product. Many other illustrations are given of which the generalized divergence and curl are especially noteworthy.

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*The Atom and the Bohr Theory of its Structure.* By H. A. Kramers and Helge Holst. New York, Knopf, 1923. xiii + 210 pages.

This volume contains an excellent English translation by R. B. Lindsay and Rachel T. Lindsay of the Danish original by the authors named. There is an introduction by Sir Ernest Rutherford. The latter recommends the book as a clearly written and accurate account of the development of our ideas on atomic structure. My purpose in writing a note about the book in this place is to call the attention of mathematicians to the fact that we have here a self-contained introduction to the important ideas of Bohr and his followers concerning the atomic structure of matter. This book itself is free of mathematical detail. But the theories to which it gives an introduction involve problems of great difficulty and importance requiring the combined skill of the mathematician and the physicist for their resolution. After a brief account of the earlier development of the atomic theory the authors set forth the ideas of Bohr in some detail for the case of the hydrogen atom. The nature of the problems which arise become manifest here in their simplest form. Then several applications are made to various problems of atomic structure. The book will serve to orient the reader in the whole field. Details are not given of the mathematical problems; but one acquainted with as much of the theory as this book contains will find it comfortable to proceed to the memoirs. The Bohr theory opens up a great opportunity for the cooperation of mathematics and physics in solving one of the most fundamental problems of all natural science.

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