BOOK REVIEW

Vector and tensor analysis. By H. V. Craig. New York and London, McGraw-Hill, 1943. 14+434 pp. $3.50.

During the last decade, there has been considerable emphasis on the presentation of subjects in textbooks from the axiomatic viewpoint. This approach implies carefully worded definitions, axioms, and theorems. Further, in this point of view, the stress is placed on the analytical and logical rather than the geometrical and physical aspects of a subject. The type of presentation associated with this view has furnished interesting and valuable textbooks in such introductory subjects as college algebra and calculus. Previously, no such presentation had been attempted for a senior-graduate level text in vector and tensor analysis. Craig has admirably presented vector and tensor analysis in the light of this analytical-logical viewpoint.

In writing such a text on vector and tensor analysis, a subject whose origins and developments are closely connected with geometry and physics, an author faces many problems. Perhaps one of the most difficult of these problems is concerned with the author's treatment of differentials. From the logical viewpoint, differentials are non-essential tools since all their functions may be performed by derivatives. However, differentials act in two very important roles in vector and tensor analysis. First, the literature, both past and present, of the subject abounds in the use of differential notation. Second, differentials are useful to both the geometer and the physicist in interpreting his results. From these interpretations, many new results have been obtained, often by proofs which are incorrect from the modern point of view. However, rigor and concise thinking are fundamental to the author's approach to the subject. Hence, he has chosen to omit the treatment of differentials. Another important problem is the treatment of coordinate transformations and invariants. Very few introductory texts to vector and tensor analysis furnish an adequate treatment of this important topic. The principal difficulty is that a proper presentation of this topic requires that the student possess a knowledge of determinants and linear transformations. Because of the present author's analytical approach, he is able to offer an excellent account of this subject. In fact, the concept of invariance dominates the greater part of the book.

The book is divided into four parts; Part A deals with advanced calculus; Part B with elementary vector analysis; Part C with tensors and extensors; Part D with applications.