oriented backgrounds. A disappointing feature of the book is the lack of full-length listings of the author's own defect production and annealing programs (*e.g. DYNAM* and *RINGO*) to which many references are made.

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Vectors and tensors in crystallography. By DONALD E. SANDS. Pp. xvi+228. Reading, MA: Addison-Wesley Advanced Book Program/World Science Division, 1982. Price $26.50.

Vectors and tensors are important in the mathematical description of crystallographic phenomena. For example, the repetition of a motif by translation can be represented by a vector, while other physical properties of crystals such as thermal conductivity, strain or optical activity can only be described by tensors.

As far as the reviewer knows, only a few treatises of crystallography offer instructions on how to manipulate vectors and tensors in general coordinate systems. Donald E. Sands's new book is just such a treatment of vector and tensor analysis in rectilinear systems. It is intended especially for crystallographers and, therefore, the emphasis is on crystallographic applications; but the methods developed are essential in any other problems that pertain to non-orthogonal systems.

The content of the book is well arranged and each chapter is completed by exercises. These exercises constitute a source of help for the scientist who is confronted by a problem that might yield to vector and tensor methods. Answers, hints and suggestions are given in an appendix. From the beginning, terms such as covariant and contravariant as well as Einstein's summation convention are consistently used. This requires some particular attention on the part of the reader, but it offers a considerable economy of notation.

Chapters 1, 3 and 4 present the fundamentals of vector and tensor analysis in rectilinear systems and can be regarded as the core of the book. Chapter 1 develops the vector algebra of such systems; several 'products' of vectors and the metric tensor are introduced. With these definitions chapter 2 shows how lines and planes may be characterized. The transformation theory, the exact definition of a tensor and its rank are presented in chapter 3. Then, eight sections of special applications follow, for example, anisotropic temperature factor, principal-axes transformation and rigid-body motion. Chapter 4 deals with a tensor treatment of symmetry. Among other things, Seitz operators are explained and point-group symmetry in both direct and reciprocal spaces as well as space-group symmetry are discussed. A table of all standard symmetry operators in direct and reciprocal space is given. The fifth chapter provides examples of physical properties of crystals that can be described by tensors. Chapter 6 summarizes some specific experimental techniques for observing the diffraction of X-rays by crystals. Especially for crystallographers who have to operate single-crystal diffractometers the sections on Eulerian and κ geometry might be very useful. Finally, chapter 7 is a brief survey of curvilinear spaces.

This book, of course, does not claim to be an encyclopedia of vector and tensor formulas, but it should be a convenient and handy reference for everyday use in crystallography or in other fields where rectilinear axes are appropriate. The occasionally complicated symbolism is clearly typeset and only a few errors have escaped the editorial filter. The comprehensive glossary of symbols at the beginning is extremely helpful, because, in books like this one, notational problems are inevitable.

Donald E. Sands's book could serve as a suitable textbook for a graduate course in vector and tensor analysis. It seems also appropriate as a companion to any book that teaches the crystallographic principles. It has been designed to be suitable for self-study. Therefore, this book can be heartily recommended to every crystallographer, students of crystallography and other solid-state scientists.

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Books Received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

Crystal lattices, interfaces, matrices. By W. BOLLMANN. PP. vii+360. Published by the author, 1983. Obtainable in N. America from Polycrystal Book Services, PO Box 27, Western Springs, IL 60558, USA, price US $45.00 *plus* mail & handling costs; or, in all other countries, from Professor W. Bollmann, 22 Chemin Vert, CH-1234, Pinchat, Geneva, Switzerland, price (including mail & handling costs): European countries SwF 70.00, non-European countries SwF 80.00. A review of this book, by M. S. Delaney, has been published in the April issue of *Journal of Applied Crystallography*, page 123.