BOOK REVIEWS

Towards Scientography by Eugene Garfield, (Published by the Institute for Scientific Information, 3501 Market Street, Philadelphia, PA 19104, USA) 1988, pp. xii+452. Price: Not stated.

The word 'scientography' coined by George Vladutz, ISI's manager of basic research, 'reflects both the derivation of mapping from the field of scientometrics and the broad geographic focus of the maps themselves'. It is therefore appropriate that this ninth volume of the 'Essays of an Information Scientist' is titled *Towards Scientography*. In fact almost all the 51 articles and the four chosen reprints published in this volume deal with one aspect or the other of scientometric analysis of publications of research endeavours, like the most cited primary authors, the most cited articles, and journal citation studies, and of topics such as Fluoridation, Breast is best, Schistosomiasis, Hazardous waste, Mapping cholera research, and Biomedical decision making, as well as introducing the new journal *The Scientist* or the new SCI-Mate software system. In fact one would be surprised to see the variety in these 51 articles; there is some topic of interest for everyone.

The research group at ISI has designed a method of mapping the scientific endeavours of the world for tracing the strength of the inter-relationships between two fields and to identify the realms of science that are being most actively investigated and the individuals, publications, institutions and nations that are currently pre-eminent in these areas. Though one may wonder what these maps are without proper designation of the axes, they however provide a conceptual framework in the mind of the reader regarding the development of an idea, closely related research successes, and the remote control this idea had on a weakly linked area. The utility of these multi-dimensional scaling maps has not yet been fully exploited, though the author has demonstrated their predictive capability in many exercises, including that of the field of the 1985 Economics Nobel Prize (Prof. F. Modigliani) and the 1986 NAS award for excellence in scientific reviewing (astronomy and astrophysics, Prof. Virgina L. Trimble).

Though I have indicated the wide variety and scope of the articles covered in this volume, it is necessary that we speak in the language of Garfield, namely in terms of citation counts. In these 51 articles, excluding the reprints and the supplementary bibliography (30) in one article, the author has quoted nearly 1219 references from various sources like scholarly journals, the lay press, private communications, etc. at an average of 24 references per article. This indicates the depth to which each of these articles has been planned. It is necessary to point out that out of these 1219 references, 201 are Garfield's own work (i.e. about 4 references per article or ~16% of the references are self-citations), which shows how the author had been constantly contemplating on the various issues discussed in this volume. Though one would have liked to extend this citation counting method to a more in-depth analysis of this book, it will not be proper to evaluate this endeavour on the same scale (namely citation counts) that it advocates for evaluating scientific enterprise in the world. One of the earlier reviewers of this volume had written about the conversational style of the articles. It is certain that if a scientist were to read this book he would find out the relevance of his scientific pursuit in the global context and the appropriateness and adequacy of the scientific journals that he chooses to publish his results, especially when he wants to get some visibility in the scientific world.

It may be that one day ISI will come out with three-dimensional contour maps of the scientific terrain and it is therefore necessary that we equip ourselves to understand and read these maps. We can be initiated by studying the two-dimensional analogues in *Towards Scientography*.

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The Rotation and Lorentz Groups and their Representations for Physicists, by K. N. Srinivasa Rao, (Published by Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 002), 1988, pp. 358, Price: Rs 200/-.

This book is a useful addition to the existing group-theoretic literature. Admittedly the author

draws inspiration from the classic treatises on rotation and Lorentz groups by the leading experts of the Russian school. While the existing books of Gel'fand *et al* and Naimark mainly deal with the formal properties of unitary representations, Prof. Rao's book gives a more detailed exposition of the basic matrices of rotation and Lorentz transformation. A certain amount of synthesis between these two groups has been achieved by identifying rotation and Lorentz transformation as the multiplicative groups of real and complex unit quaternions. The specific realization of the quaternion units in terms of the Pauli matrices leads naturally to the spinor group SU(2) for real quaternions. For complex quaternions, on the other hand, the unit quaternion group turns out to be isomorphic to the complex unimodular group SL(2, C). A lucid discussion of Hamilton's quaternion approach leading to the determination of the angle and axis of the product of two rotations in terms of the angles and axes of the individual rotations is a significant feature of this book. A parallel analysis of the Lorentz transformation leading to the Wigner rotation in terms of the product of two pure Lorentz boosts would have been an interesting addition.

The first four chapters of the book deal with the basic concepts of groups, linear vector space and elements of representation theory. Since these are of an introductory nature the subtle distinction between operator and subspace irreducibility seems to be somewhat redundant. The rotation group is treated in considerable detail. The figure (5.1) is a little confusing for a beginner. The projection OA of OB seems to be greater than the vector OB itself! I hope this will be corrected in later editions. In addition to the traditional geometric method leading to the Euler angle parametrization an analytical approach has been given. This is particularly suitable for rotation groups in higher dimensions. The Euler–Brauer resolution which follows along similar lines is not easily available elsewhere. The rest of this chapter is devoted to the construction of the irreducible representations of the so(3) algebra and its exponentiation. The D-function has been calculated by the traditional method using the monomial SU(2) basis. Little attention has been paid to the mathematical structure of this carrier space, which is a Hilbert space of analytic fuctions having many interesting properties. The next chapter mainly deals with the finite-dimensional nonunitary representations of SL(2, C). The eigenvalue problem for an orthochronous proper Lorentz transformation (OPLT) and the associated invariants have been thoroughly discussed and the author understandably devotes some space to an invariant classification of OPLT. The algebraic method for the Euler resolution has been applied to arrive at the canonical decomposition of SL(2, C). But in the opinion of the reviewer the section on the Euler–Brauer type resolution is incomplete because the author does not explain whether this decomposition covers the full parameter domain. Much of the rest of this chapter is devoted to the determination of the matrix elements of finite transformation and related problems. The unitary infinite-dimensional representations have only been touched upon.

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