

Book news

1. Book reviews

● *Quantitative texture analysis*, edited by H. J. Bunge and C. Esling. Deutsche Gesellschaft für Metallkunde, 1982. 551 pp.

Reviewer: L. M. Matthews

This book is a collection of material that was given at a course on advanced texture analysis held at Mentz in 1979 and Clausthal-Zellerfeld in 1981. Texture analysis is an X-ray-diffraction technique that is used in the determination of preferred orientation in polycrystalline materials, and different aspects of this technique are discussed by several authors in different chapters in the book. The advanced nature of the contents and the rigorous mathematical treatment of all the topics discussed make a background in diffraction, mathematics, and the concept of preferred orientation a prerequisite for anyone working through the text.

The book starts by introducing the orientation distribution function (ODF), which is obtained as the solution to an equation known as the 'fundamental relationship'. The different methods (series expansion, the vector method, and inverse pole figures) used to solve the equation are given in chapters 1, 14, and 22 respectively. These can be seen as the basis of quantitative texture analysis. The other chapters of the book are more of a supplementary nature, and can be classified roughly under the following three headings: general, computational, and applications.

Those under the first heading are chapters that expand on the previously mentioned chapters, discussing practical considerations and recent advances in texture analysis. The comparison of different terminologies used by workers and the determination of errors made by the use of different experimental techniques are also discussed. Under the second heading are chapters in which the computer programs used to solve the 'fundamental relationship' for three different crystal symmetries are discussed. Finally, chapters on the representation of texture data, the exploitation of results, the change in texture due to phase transformation, and the change due to recrystallization can be grouped under the heading of applications.

On the whole, the book covers texture analysis extensively. However, a big drawback is the book's inconsistency, the lack of progressive placing of chapters, and references that are given in the text but not in the list of references. For this reason, it is not recommended that this book be used as a textbook in the study of texture analysis, but rather as a well-detailed reference book.

● *Boundary element methods in solid mechanics* by S. L. Crouch and A. M. Starfield.

Reviewer: J. A. C. Diering

A book of this nature is long overdue in the field of solid mechanics or rock mechanics. It has a good balance of mathematics and numerical examples, but very much to the credit of the authors is the fact that complex mathematical derivations are described in very readable English. The book is a much extended version of the

geomechanics report *Analysis of Stresses and Displacements around Underground Excavations: an Application of the Displacement Discontinuity Method*, which was written by Crouch in 1976.

Briefly, the book includes the following.

- (i) Review of linear elasticity
- (ii) Introduction of boundary elements
- (iii) Chapters on the fictitious stress, displacement discontinuity, and direct boundary integral methods
- (iv) Improvements, extensions to, and applications in rock mechanics and geological engineering
- (v) Three computer programs (with listing) for two-dimensional stress analysis.

Of particular interest is the section on bonded half planes, which shows how boundary elements can be used for unhomogeneous problems without the need for the placing of boundary elements along the interface as is done with many other boundary element formulations.

It is a little disappointing, however, that only 10 of the 322 pages are devoted to three-dimensional problems. All the two-dimensional problems described can be modelled with finite element methods (although not as efficiently as with boundary elements). In three dimensions, however, the exterior type of problem usually becomes prohibitively expensive and cumbersome when modelled with finite elements, so that boundary elements offer the only *practical* solution to this type of problem. No examples are given in the book of three-dimensional problems that are not tabular.

Another aspect that surprised me, although this is not a criticism, is that the evaluation of all the influence coefficients is done in closed form. Numerical integration of boundary integral coefficients has been shown elsewhere to be at least as simple and effective as the closed-form approach adopted in the book.

The inclusion of three computer programs in the book will be very useful for 'do it yourself' users. The program structures and variables closely resemble the equations and variable names in the text, so that it is easy to trace the logic in the programs and compare the various programs.

In conclusion, the book is very readable, and is a 'must' for rock mechanics practitioners who use boundary element programs in their everyday work..

● *World mineral statistics 1976-1980. Production; exports; imports*, by Institute of Geological Sciences. London, Her Majesty's Stationery Office, 1983. £18.00

Reviewer: R. P. King

This edition is the fifth in a regular series prepared by the Institute of Geological Sciences. It is a useful compilation of statistics on the production, export, and import of sixty-seven different mineral commodities. The tables span the period 1976 to 1980, and this represents a one-year roll forward from the previous volume, which

covered the period 1975 to 1979. It is the intention to update this series annually in one-year increments.

Each mineral commodity is tabulated on the basis of production, imports, and exports by country for each of the years 1976 to 1980. The tables are presented clearly, and comparisons between countries and five-year trends are easy for the reader to discern.

The data represent the latest official information available from primary sources. This publication will be of considerable assistance to all who are concerned with the production and trading of mineral commodities.

2. New publications

● *Canadian mines; perspective from 1982*. Mineral Bulletin MR 197. Supply and Services Canada, Hull, Quebec K1A 0S9, Canada.

This bulletin reports on the results of a joint federal and provincial undertaking aimed at monitoring, on an annual basis, the supply systems for the most important mineral commodities being mined in Canada. Concise overviews are presented of the Canadian reserves situation, of the supply capability on the basis of current reserves alone, of recent commitments for bringing new mines on-stream, and of the level of exploration and discovery.

● *Copper's changing cost structure*, by Commodities Research Unit Ltd (31 Mount Pleasant, London, WC1X 0AD, England).

CRU's latest survey of world copper mines shows that the slow response of supply to falling prices, which has done more than anything else to keep prices low for so long, is due to the combined effects of the structure of mine ownership and the pattern of mine costs. The survey covers every substantial mine in the non-Communist world, and includes a new form of supply schedule for measuring and forecasting industry response to movements in copper prices.

● *Petrology of metamorphic rocks*, by M. Suk. New York, Elsevier, 1983. 320 pp. U.S. \$68.00.

This book reviews Central European opinions about the origin and formation of metamorphic rocks and their genetic systems, confronting the works of such distinguished European scientists as Rosenbusch, Becke, Niggli, Sander, Eskola, Barth and others, with present-day knowledge and the results of Soviet and American investigations.

● *Applied geomorphology*, by H. Th. Verstappen. New York, Elsevier, 1983. 442 pp. U.S. \$95.75.

Comprising three parts, the book first describes how geomorphology contributes to geological, soil, hydrological, and vegetation/forest mapping. The next part deals with rural and urban land use, engineering, and mining, showing not only how geomorphological factors affect the works of man, but also the very marked effect that man has on geomorphology and environment. The last part presents three basic approaches to geomorphological surveys for environmental development.

● *Tin and its uses*, no. 137, by the International Tin Research Institute. Greenford, the Institute (Fraser Road, Greenford, Middlesex UB6 7AQ, England), 1983.

This issue contains articles on copper-nickel-tin alloys, applications of hot-tinned sheet, aspects of tinsplate research at the Institute, and summaries of the ten papers presented at the 28th German Tin Day, which was held in Düsseldorf in May 1983.

3. New journals

● *Mining Science and Technology*, edited by C. O. Brawner and B. N. Whittaker, is to be published quarterly in one volume per year by Elsevier. It will cover all aspects of the extraction from the earth of solid-mineral materials such as metallic and non-metallic ores, coals, and other solid sources of secondary materials, etc. The topics covered will include exploration and mine economics, mine planning and design, surface and underground excavation methods and equipment, ground control, mine drainage, mine surveying, mine transport systems, ventilation, environmental control, waste disposal, mine safety, legal aspects of mining, and future mining. The journal will include theoretical articles, reviews of research, accounts of mining practice, and selected case histories. Prospective authors are asked to send their manuscripts to Dr B. N. Whittaker, Mining Engineering Department, University of Nottingham, University Park, Nottingham, NG7 2RD, England.

● *Aluminium*, published monthly by Aluminium-Verlag GmbH, P.O. Box 1207, D-4000 Düsseldorf 1, F.R. Germany. DM 690.00 per annum.

Available for almost sixty years in German, this journal is now also available in English. The English edition contains complete translations of all the articles in the same month as they appear in the German edition. Special reports and news items are also included.

Rock mechanics

The South African Institute of Mining and Metallurgy is to hold two schools on 'Rock Mechanics in Mine Management' at the University of the Witwatersrand, Johannesburg, from 23rd to 27th January, 1984, and from 30th January to 3rd February, 1984.

The objective of the Schools is to provide mine management with a basis for assessing the safety and economic benefits of rock mechanics in mine planning and operations. Lectures will deal with basic principles, design procedures, and risk evaluation for underground mines. The syllabus is based on the School presented in

1977, and has been extensively updated and expanded to cover management considerations. Technical managers and those in planning will also benefit. Case studies will be held in parallel sessions for coal, base-metal, shallow, and deep-level mining. Even though the emphasis is on management applications, rock mechanics practitioners should find the Schools of great value.

For further information, please contact Mrs J. A. Money, S.A. Institute of Mining and Metallurgy, P.O. Box 61019, Marshalltown 2107. Tel.: 832-2177.

The Federation of Societies of Professional Engineers

The Federation of Societies of Professional Engineers (FSPE) has been a member of the World Federation of Engineering Organisations (WFEO) for many years and has regularly sent delegates to the biennial conference of that organisation. Every second year in October a different venue for the conference is selected in one of the countries represented at WFEO.

This year the venue was Nairobi, Kenya, and FSPE planned to send a strong delegation of three leading South African professional engineers. It is regrettable to have to report that the Kenyan Government refused to issue visas to the South African delegates, in spite of the fact that two could have travelled on British passports

and in spite of strenuous efforts on the part of WFEO itself to persuade the host government to act differently.

A letter of apology has been received from the President of WFEO, and it is pleasing to be able to report that FSPE has now issued an invitation to WFEO to host one of its future conferences in South Africa, with assurances from the South African Government that no delegate from any country will be refused permission to attend. The first reaction from WFEO has been very favourable.

Further information is available from the Public Relations Officer, The Federation of Societies of Professional Engineers, Kelvin House, 2 Hollard Street, Johannesburg, 2001. Tel.: 832-2177 (ext. 17).

Second progress report by ASRET

The Professional Engineers Joint Council was established in 1960 and initially its main function was to represent the interests of engineers. Subsequently the question of registration arose and this body was instrumental in drawing up the Professional Engineers Act.

The passing of Act No. 81 of 1968 provided for the establishment of the South African Council of Professional Engineers and the registration of Professional Engineers. The PEJC, after operating successfully for some years, became the Federation of Societies of Professional Engineers under whose auspices the Interim Committee for the Registration of Engineering Technicians and the Interim Committee for the Registration of Technologists and Engineers was established. The Professional Engineers Act was amended to allow for the establishment of Boards of Control for the registration of technicians, technologists, certificated engineers, and engineering scientists. A further step has now been taken

with the establishment of a Board of Control for Engineering Technicians (8th July, 1983) and the publication of the regulations governing the Board.

PEJC: Professional Engineers Joint Council

SACPE: SA Council for Professional Engineers

FSPE: Federation of Societies of Professional Engineers

ICRET: Interim Committee for the Registration of Engineering Technicians

ICRTE: Interim Committee for the Registration of Engineers and Technologists

ASRET: Affiliation of Societies Representing Engineering Technicians

SAARET: SA Association of Registrable Engineering Technologists

AEG: Association of Engineering Geologists

SAICMEE: SA Institute of Certificated Mechanical and Electrical Engineers

PBOC: Proposed Board of Control

Explosives technology

The Center for Explosives Technology Research (CETR) has been established at the New Mexico Institute of Mining and Technology (Tech) in Socorro, New Mexico. The Center will focus research-and-development efforts on high-strain-rate technology for materials and processes of special importance for metallurgical, mining, and defence applications.

State funds will be used for the construction of facilities, acquisition of equipment, and development of staff. Major operating funds will come from contracts with private industry for research and testing, and from joint-venture partnership with corporations for the development of proprietary processes and products. The facilities will include light-gas guns and explosive test chambers housed in specially designed buildings with shock-insulated instrumentation shelters, and with flash X-ray and high-speed recording systems. These will join some 30 existing explosives and ordnance testing sites in New Mexico Tech's 12-square-mile TERA Field Laboratory and extensive metallurgical and materials engineering laboratory facilities in operation on the Tech campus. More than \$2,6 million of State money has been budgeted for new facilities and equipment.

The research-and-development activities will be primarily in the areas of shock-wave physics and chemistry, explosives formulation and characterization, high-energy-rate fabrication (welding, forming, cladding,

compaction), materials modification high-velocity impact phenomena, and metal and rock fragmentation.

The organization and facilities of the CETR will be a component of Tech's Research and Development Division and will be complemented by cooperative relationships with departments of Los Alamos and Sandia National Laboratories. A Technical Advisory Committee comprising distinguished representatives of the national laboratories, industry, and academic research is being assembled to guide the establishment of the Center and to conduct a search for a Director and other key staff.

The State of New Mexico is funding the establishment of the Center as a part of its Rio Grande Research Corridor project to attract high-technology economic activity to the State. Similar centres of excellence have been funded at other New Mexico universities, each with its own specialized focus. To support the State's economic-development objectives, Tech is also constructing a Research Park, with separate funds, for the location of industrial research-and-development and production facilities. For additional information contact Dr Marc A. Meyers, Associate Director, Center for Explosives Technology Research, New Mexico Institute of Mining and Technology, Socorro, New Mexico 87801-9990, U.S.A. Telephone: (505) 835-5831.

International Tunnelling Association

A conference entitled 'Ita Tunnels 1984' will be held in Caracas, Venezuela, from 2nd to 7th June, 1984. The conference has already attracted papers from many top professionals in both the engineering and construction community.

For further information contact Mr Jack Lemley, c/o Morrison-Knudsen Company Inc., P.O. Box 7808, Boise, Idaho 83729, U.S.A. Tel. no. (208) 386-5880; U.S.A. Telex no. 368439.

Automation

The IFAC Symposium on Automation for Mineral Resource Development is to be held in Brisbane (Australia) from 9th to 11th July, 1985.

Mineral resources are frequently located in remote or hazardous areas, and techniques involving automation, remote control, and automatic control are important in their development. Metalliferous nodules are now being experimentally mined on the ocean floor, minerals are mined on land at depths approaching 4 km and in areas of extremely high temperatures, and coal is mined in areas prone to gas and rock outbursts, and roof falls. Mines are being developed in harsh environments ranging from hot, remote desert areas to the Arctic. The purpose of the Symposium is to discuss the use of advanced automation technology in the development of mineral resources, with particular emphasis on those which occur in remote areas or potentially hazardous environments. Sessions will be concerned with robotics, automation, and appropriate control techniques.

The topics include the following: automated mining systems, undersea mining, remote areas, hazardous environments, ground control and excavation design, hard rock and soft rock systems, monitoring and communication, mineral transportation, case studies, automated extraction systems, *in situ* techniques including gasification, mineral concentration and extraction systems, case studies, general, remote sensing and image processing, robotics and the working environment, simulators for system design and personnel training, education for automated mining and extraction systems.

Theoretical and applied papers in other areas will be considered if their application to the main theme is clearly demonstrated. The closing date for the submission of abstracts is 1st April, 1984.

Further information is available from The Chief Executive Officer, The Australian Institute of Mining and Metallurgy, P.O. Box 310, Carlton South, Victoria, Australia 3053.