

## BOOK REVIEWS

**Limits of plastics uses in vehicle construction in the eighties** VDI-Verlag GmbH, Dusseldorf, 1981, pp. 232 + vi, \$ 42.50.

The development of the automobile industry in the west after the Second World War bears a clear reflection of the changing priorities over the decades—priorities which originated either from customer, legislative authorities or economic constraints with varying emphasis. In the mid-sixties it was the consideration of internal and external safety which dominated the designers' options, giving place in the early seventies to measures aimed at reducing air pollution by exhaust gases as required by legislation. The crude oil crisis in the subsequent years brought in energy saving as the primary goal of the developers. In this context, the use of plastics and aluminium for light construction of vehicles caught the imagination of progressive car companies. Entire cars made of plastic were proposed and also built as samples. Plastics cars in the mid-eighties were considered to be a viable goal. However, the essential progress in plastics utilisation in automobile industry has been far short of expectation. The reasons for this delay in the plastics age are not hard to find. Plastics stand under many disadvantages. The major one is the fact that plastics are still today specified as ancillaries which have to compete against a sheet metal parts manufacturing system that has improved and automated with all refinements including the use of robots. Large scale application of plastics in vehicle construction can thus be likened to 'an attempt to jump onto a moving train' which is continually gathering speed.

The energy crisis and limited reserves of raw materials are most frequently cited today to justify individual goals of technological development. However, the goals chosen in many cases are not based on realistic comparisons but rather on biased notions. Plastics uses in vehicle construction represent one such case. While nobody contests that energy consumption on volume basis is much smaller for plastics than it is for steel, unfortunately it is often overlooked that considerations of strength of manufacturing techniques call for some three-fold greater volume of plastics material so that actual energy savings on the raw materials sector can hardly be significant. Again, in the matter of weight reduction achieved by the use of plastics and the consequent reduction in fuel consumption when driving the vehicle, it must be borne in mind that the fuel consumption of vehicle also depends on many other parameters, such as air resistance, gear system, engine type, etc., and that the fuel savings achieved by weight reduction are

only minimal. For instance, a 10% reduction in the vehicle weight leads to fuel savings of only 1.5% and 2% in petrol engine and diesel engine respectively, compared to a 5% fuel saving in both types of engine that results from a 10% reduction in air resistance by a suitable design of the car body.

Because of the above reasons the euphoristic hopes of intensified use of plastics in vehicle construction have not been fulfilled. Tentative experiments are still being performed on the use of one or other of the several types of plastics for the manufacture of different vehicle components. In this context, the book under review makes a welcome contribution to the subject. Several contributed articles by experts deal with technical, economic and design aspects of the use of plastics in automobile construction. Especially dealt with are the glass-fibre reinforced polyurethane plastics, with as many as three articles being devoted to the automotive applications of these plastics. Surprisingly, there is not a single article dealing exclusively with thermoplastics like polypropylene and polycarbonate which have made a successful breakthrough in automotive applications by virtue of their economical production in large quantities. As the book is composed of independently written articles by different authors, there is an obvious lack of continuity and uniformity in focus and depth, though all the articles deal with one aspect or other of automotive applications of plastics. The article on glass-fibre reinforced plastics in automobile construction by Klaus-Dieter Johnke is the longest one in the book and it provides a large body of valuable technical information ably supported by useful literature references. This is followed by another interesting article by Ganter Walter which furnishes a large number of examples with illustrations on the use of plastics in functional parts of automobiles. The subsequent three small articles are devoted to reinforced polyurethane and its applications in automobile construction. New concepts for using plastics in automobile doors and flaps are dealt with in a stimulating and profusely illustrated article by Edmund Hellriegel. Though the article on computer-aided design and finite element method techniques by Christian Hildebrandt appears to be out of tune with the other articles dedicated to topics concerning the use of plastics, its importance cannot be denied in view of the urgent need for new methods of analysis and development in order to minimise the risks involved in materials substitution in structural applications. The importance of production planning which stands as a link between technical development and actual production, transposing innovative constructional ideas into an efficient and technologically feasible manufacturing activity, cannot be overemphasized. The article by Folker Weissgerber and Klaus-Peter Michaelis which presents a procedural approach for planning automobiles as well as automobile components, together with their economic aspects, is a useful contribution marking the final chapter of the book.

Through its ten independent articles the book provides a glimpse of the various application possibilities of plastics in automobiles, covering both the current practice and the future trend. However, due to limitation of space, the articles are necessarily of a review type with little details. In view of this, references should have been provided at the end of each article to enable the interested reader to follow up with further reading of the

relevant literature. That apart, the book with its forthright and stimulating articles is bound to promote interest in plastics uses for vehicle construction based on a pragmatic approach.

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MANAS CHANDA.

**Engineering principles of acoustics** by Douglas D Reynolds. Allyn and Bacon, International Student Edition, 1981, pp. 641, £ 9.95. Indian orders to UBS Publishers Distributors Ltd., 5, Ansari Road, Box 7015, New Delhi 110 002.

The volume, written as a text book, contains 13 chapters and 7 appendices. It starts with introduction of simple harmonic motion and representation of complex numbers. Then follows two chapters on fundamentals of vibration. These include, apart from the classical matter, design of a vibration isolation system, shock excitation, properties of felt and cork resilient materials, rubber resilient elements, foundation stiffness, air springs criteria for vibration isolation of mechanical equipment, and dynamic absorbers.

There is a fairly comprehensive chapter on the Fourier series, Fourier transforms, Laplace transforms, convolution integral, characterization of random signals, statistical averages, etc.

Wave motion is introduced in the next chapter. It is applied to analysis of vibration of continuous systems governed by the classical wave equation, viz., strings, bars and membranes.

Chapters 7 to 13 deal with acoustic waves. Equations for one-dimensional acoustic waves are derived for plane waves and spherical waves, and terms like acoustic intensity, power, levels, etc. are introduced. Acoustic transmission phenomena are dealt with in detail for normal as well as oblique incidence. These are applied for discussion of transmission loss through panels, floor-ceiling structures, acoustic leaks and flanking sound transmission.

Analysis of acoustic ducts and filters includes side branch, expansion chamber and plenum chambers. Unfortunately, there is no reference to the effect of flow, nor is there a mention of typical values of source impedances of common acoustic sources.

Sound field in an enclosure has been discussed on conventional lines. It includes reverberation time and sound absorption of rooms. Sound propagation outdoor has been dealt with at length so as to emphasize the effects of meteorological conditions like temperature gradient and wind gradient on wave propagation. Excess attenuation

associated with shadow zones, air sound absorption, barriers, ground effects, plantings and trees, wind turbulence, rain, sleet, snow and fog has also been dealt with.

The chapter on human response to noise includes, apart from the acoustic characteristics of the ear, community reaction to noise with special reference to traffic, aircraft, railroad and industrial noises.

The last chapter introduces the reader to general three-dimensional wave propagation and application of the same to basic mechanisms of noise radiation, viz., monopoles, dipoles and quadrupoles. Sound radiation from a piston in an infinite baffle and from cylindrical sound sources are also discussed.

The book covers indeed fundamentals of vibration and noise control, but needs to be supplemented by books on structure-borne sound, aeroacoustics, etc. for application to industrial noise control.

The book is aimed primarily at senior undergraduate students. Every section is illustrated through fully solved examples, and articles are so well written that the book can also be used for self-reading. Unfortunately the unsolved problems have not been provided with answers.

The author has taken care to include some of the tools required for analysis, viz., theory of random variables, integral transforms, etc. On the application side, he has included in the Appendices, data on the acoustical properties of common substances, absorption coefficients of some common building materials and standards pertaining to noise measurements and control.

The book is indeed very lucidly written and represents one of the very few books available at present that can be used as text-books for a first course in Acoustical Engineering or Introduction to noise and vibration control.

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M. L. MUNJAL

**Transport processes and unit operations** by C. J. Geankoplis. Allyn and Bacon, London, 1978, pp. x + 650, £ 9.95. Indian orders to UBS Publishers' Distributors Ltd., New Delhi 110 002.

When Chemical Engineering discipline emerged in a few universities in India in early 30s, the bible for undergraduate study was either the classical introductory book by Badger and McCabe or the advanced text by Walker-Lewis, McAdams and Gilliland in early 50s. Brown brought out his *Unit Operations* in 1950. Advanced topics of such unit operations like heat transfer, liquid extraction and gas absorption were brought out by

such distinguished authors like McAdams, Treybal, Sherwood and Pigford. In the meantime, the early version of *Elements of Chemical Engineering* by Badger and McCabe was revised by Badger and Bunchero (1955). Foust brought out the book on unit operations in 1969. McCabe and Smith brought out yet another textbook on unit operations in 1967. About the same time, the most comprehensive treatise in chemical engineering with emphasis on unit operations was brought out in three volumes by Coulson and Richardson. These have continued to occupy the most hallowed place in undergraduate chemical engineering curriculum and to a limited extent in graduate course work. Over the decades, the most valuable source book for chemical engineering design had been *Perry's Handbook* which has gone through several editions, the fifth one being in 1973. In the midst of such galaxy of undergraduate text-books for chemical engineering, the latest arrival on the scene entitled *Transport processes and unit operations* by C. J. Geankoplis compares only modestly with the rest. There is nothing unique in the textbook either by way of new methodology of systems approach to the study of unit operations or a novel way of treating the analytic features in a comprehensive way. Evidently this book is a sequel to the one brought out by the same author in 1972 for the use of students at the Ohio State University in the US. The book contains some material under 'Selected Topics in Certain Chapters' that can be covered through self-study by undergraduate students who desire to know more than what is covered at the elementary level. The book published by Allyn and Bacon Inc. is quite attractive. The printing and get-up are excellent and the figures are neat. This book could be recommended for additional reading assignment for students who undertake literature survey for their undergraduate project because at the end of each chapter, a list of references is included. This should indeed prove useful.

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**Mechanical vibrations : Theory and applications** and the accompanying '*Solutions manual*' by Francis S. Tse, Ivan E. Morse and Rolland T. Hinkle. Allyn and Bacon Inc, International Student Edition. Indian orders to UBS Publishers' Distributors Ltd., New Delhi 110 002. (Main volume—pp. xiii + 449, £ 8.95 ; Manual—pp. 217, £ 3.95).

This text presents fundamentals and applications of the theory of mechanical vibrations. There are nine chapters and four appendices.

An introduction of vibratory motion and simple harmonic motion is followed by analysis of systems with one degree of freedom. Equations are derived by the energy method as well as by Newton's method. Solution of the resulting differential equation is discussed at length with reference to steady-state motion, as also transients. Impe

dance concept is brought in for the frequency response method. The application of the theory includes rotating and reciprocating unbalance, vibration isolation and transmissibility, seismic instruments, etc.

The chapter on multi-degree-of-freedom systems includes concepts of generalized coordinates and coordinate coupling, model analysis, influence coefficients, etc. A number of methods are discussed for finding natural frequencies, viz., Dunkerley's equation, Rayleigh method, Transfer matrix method, and the good old Holzer method. Then follows a chapter on general matrix methods with due coverage of the concepts of principal coordinates, orthogonality of principal modes, matrix iteration for the eigenvalue problem, etc.

The chapter on continuous systems includes wave equation, separable solution, flexural vibrations, orthogonality of natural modes, Lagrange equations and the Rayleigh-Ritz method. The following chapter on non-linear systems is elementary, but good enough for a book that deals primarily with linear systems.

The last chapter dealing with solutions by digital computers includes not only the methods but also working programs in FORTRAN with print-outs of the typical results, for various general methods for analysis of linear dynamical systems.

Like its predecessor, which the reviewer has been following for a first course on vibration of linear systems for many years, this second edition of the book is indeed very well written.

Substantial revision has been effected in the present edition. In particular, the chapter on analog computation has been replaced by one on digital computation. This is a welcome replacement as digital computer is much faster and easier to handle for solutions of linear dynamical systems. Provision of solutions to problems in the accompanying manual fulfils a dire need of the students. The addition of a chapter on continuous systems in the present edition makes the book suitable as a complete text on linear systems.

The authors have done well to include a couple of sections on transfer matrix method, and replace the English system of units by SI units. Unfortunately, however, the forced response of mixed-element linear systems, for which the transfer-matrix method (aided by electromechanical analogies) is ideally suited, has not been included. This would be necessary if one were to analyse long torsional and flexural systems.

Nevertheless, on the whole, the book will find increased favour from the students as well as teachers, as one of the best text-books available on the subject.

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**Microprocessor systems design and applications** edited by Dave Bursky. Hayden Book Company, 59, Essex street, Rochelle Park, New York 07662, USA, 1980, pp, 180, \$ 9.95.

The book is an edited compilation of twenty-nine articles selected from the magazine *Electronic Design*. The articles are grouped under five sections. The first section on multiprocessing and microprocessors carries four articles on multiple/multiprocessor configuration. Associated problems/and solutions on bus contention/arbitration, common memory access and the effectiveness of mail box/interrupt techniques for enhancing the competing power of the resultant system are discussed. The problem of execution of a common program partitioned into independent tasks with interprocess communication for coordination of partitioned tasks deserved at least one article on the subject.

The second section on Microprocessor Communication and Interfacing carries five articles devoted to register-to-register transfers, bus structures for partly line and Daisy chain modes of data transfers, synchronous/asynchronous serial data transmission with error checks and data transfer compatibility with IEEE-488 Bus. The last article in this section deals with the design of shared bus for Daisy-chained interconnection and efficient transaction between the microprocessor and its peripherals. The support chips for peripheral centrals, parallel output, and synchronous/asynchronous communication are also described with their modes of operation.

The third section on Peripheral Interfaces for Microprocessor Systems includes ten articles of which four are devoted to CRT controllers and three to floppy disk controllers. The coverage of graphic/alphanumeric display techniques along with controller design for simple dual density floppy disk is rather comprehensive. This section also carries a complete survey of LSI support chips for various CPU and peripheral control functions including memory management and mathematical and signal processing. The last two articles deal with an eight bit I/O processor and sixteen bit I/O processor intended to relieve the master CPU for working on data processing tasks only. Monitoring of as many as 128 sensors with FIFO buffering is explained in detail. Concurrent running of main CPU and the I/O processor is discussed in detail with reference to Intel's MPU 8086 and I/O processor 8089.

The section on Testing and Troubleshooting Microprocessor Systems carries six articles covering the topics of diagnostic techniques such as logic analysis and signature analysis. Logic analysers for state and time analysis are examined in detail as to their utility for troubleshooting the various digital systems. Hardware emulation employing one microprocessor to test another is also discussed. In fact, troubleshooting techniques for complex systems admit of ingenuity in the design of test sets on the basis of characteristics specific to the system under test. The above aspect is discussed in one of the articles in this section. Self-check with built-in circuit aids is suggested for fault locations in complex systems.

The last section on Miscellaneous Applications includes four articles on applications oriented microprocessor-based systems. Design of a simple and economical Development System around MOS Technology's MPU 6502 is given. The article on microprocessor-based tester for high-power diodes covers the design details and trade off involved in the development of a microprocessor-based system. This section could have been well supported with one or two more examples of microprocessor-based controllers for industrial processes.

An additional section on the application softwares would have been a fitting sequel to the foregoing sections. Each of the five sections of the articles carries the Editor's overview of the topics covered. The overviews would have been well supported by a thoughtful bibliography of selected readings intended to help the readers appreciate the very wide spectrum of applications and growth capabilities of microprocessors.

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**Guidance and control 1980**, Advances in the Astronautical Sciences, Vol. 42, Ed. Louis A. Mourie, American Astronautical Society, 1980, pp. 738, \$ 45. Orders to Univelt Inc., P.O.Box 28130, San Diego, Ca 92128, USA.

The volume presents proceedings of the Annual Rocky Mountain Guidance and Control Conference held during 17-21 February 1980 at Keystone, Colorado, U.S.A. The thirty papers included in the volume are grouped into five sections : attitude determination and control in earth orbit, pointing and control in deep space, future control for spacecraft, digital control for aerospace, and a paper display session. The display session consists of papers on miscellaneous topics such as education in aerospace control, subsystem development of a star scanner, payload retention actuators for space shuttle, Gimbleflex-inertially stabilized platform, and guidance and control for an adaptive information retrieval system. These papers (some in the form of view graphs) present essential features of the concerned systems. Papers in the other sessions go into greater depth of system description, design, analysis and performance. Several papers discuss attitude determination and control systems for high accuracy missions flown/proposed. These include papers on the earth satellites P 80-1, P 78-2 (SCATHA) FLTSATCOM, skylab (reentry attitude control), TDRSS, the defence meteorological satellite system ; and the interplanetary spacecraft Voyager, Galileo, Solar-Polar Spacecraft, and International Comet Mission. A few of these spacecraft posed great challenges for which unique solutions are found employing latest techniques in control, computer and sensor technology. The papers should be useful to designers. A couple of papers discuss use of the Tracking and Data Relay Satellite System (TDRSS) and the Global Positioning System (GPS) for autonomous navigation.



The section on future control concepts for spacecraft includes three analytical and three hardware development papers. Papers on a two-body control for rapid attitude manoeuvre, gimbaled line pointing in noisy environment, and rotational manoeuvre of large flexible spacecraft should be of interest to analysts. The other three discuss design, development, test and possible applications of a space optics correction system, high precision gyro, and a multi-mission attitude determination and autonomous navigation (MADAN) system. Digital hardware, onboard computers and their application to attitude determination, control and navigation is the subject of five papers in the last section. They present a general overview and current trends in the field.

The four sections also include papers presenting good historic surveys and future projections. The topics covered and attitude control challenges for the earth orbiters, pointing and control for planetary spacecraft; the first twenty years and the next twenty years, active control of flexible space structures, and digital mechanization of structural control.

In summary, the volume contains several papers which should be of interest to satellite control system engineers and mission analysts.

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**Shuttle Spacelab : The new transportation system and its utilization, Advances in the Astronautical Sciences, Vol. 43, Ed. D. E. Koelle and G. V. Butler. American Astronautical Society, 1981, pp. 342, \$ 35. Orders to Univelt, Inc, P.O. Box 28130, San Diego, Ca 92128, USA.**

The volume presents proceedings of the Third DGLR/AAS Symposium on Shuttle/Spacelab Utilization, held at Hannover, Germany, in April 1980. It begins with two opening addresses on space policies for the 1980s and international co operation. The papers briefly remark on the past and present programmes and possible direction for this decade. The next three papers summarise the proposed utilization plans for the space shuttle and Spacelab. Some suggestions on possible follow-on developments are also made. Progress/status reports on the Space Shuttle, the Spacelab, the Inertial Upper Stage (IUS), the Payload Assist Module (PAN), the Shuttle's Remote Manipulation Arm, and the Shuttle Pallet (SPAS) system are presented in the next group of six papers. They also include a brief overview of the system functions. The next two papers give an interesting description of the Manned Manoeuvring Unit (MMU) and Manned Remote Work Station (MRWS), which can extend the utilization capacity of the Space Shuttle significantly.

The objectives and some instruments for the Galileo : Jupiter Orbiter project, the MAUS-Space processing Payload, and the IR-Telescope project GIRL (German Infrared

Laboratory) are described in the next three papers. The final section deals with advanced systems and long term space programmes with four papers giving some interesting projections on space operations, advance space transportation systems, solar electric propulsion, and a possible European space transportation system. The last one goes into some details of design tradeoffs. Though not many technical details, analysis or results are included, the volume should be useful to the potential users of the Shuttle and Spacelab systems.

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**Space-Enhancing technological leadership, Advances in Astronautical Sciences**  
Vol. 44, Ed. L. P. Greene, American Astronautical Society, 1981, pp. 580, \$ 50  
Orders to Univelt, Inc., P.O. Box 28130, San Diego, Ca 92128, USA.

The volume presents proceedings of the 27th AAS Annual Conference held at Boston, Massachusetts, USA, during October 1980. Many of the thirty-eight full papers and a few abstracts presented in the volume deal with some current developments and challenges of the future in space technology. The first two papers summarise two keynote addresses. These philosophical papers emphasize a need for the US to push ahead in space technology to keep its technological leadership in the world. The next five papers present an overview and some operational details of the advanced communication and navigation satellite systems and sub-systems, namely the global positioning system, search and rescue satellite-aided tracking system, EHF satellite communication for mobile terminals, advanced communication satellites for the next decade, Transit—the navy navigational satellite system. The section on space exploration presents an interesting paper on possibilities of lunar mining, and two descriptive papers on imaging of the Venus. Next four papers briefly review NASA's programme in application of aerospace technology to energy, space power technology, space nuclear electric power systems, and studies on construction of the solar power satellites. The last one compares the cost involved in building the SPS from lunar material against that from the earth. The section on defence applications discusses the role of man in space. Design of the inertial upper stage (IUS) for the shuttle-based launch is also presented.

Earth resource survey and environment observations using satellites has been finding increasing applications in many areas. These are the themes of two sections which include a few papers presenting a good overview and design options for earth resource survey and climate observations from space. Other papers in these sections deal with the design of visible, infrared and microwave sensors, and a data management system. Material processing in space, orbiting facility, and ground based activities for the micro-gravity related phenomenon is the subject of two overview papers. The section on Guidance Control and Data Processing presents design concepts on some future super

Computers in space, a fault detection system, a back-up flight system for the space shuttle, a general discussion on navigation accuracy for users of the global positioning system. Many concepts, alternatives, cost effectiveness of building large space structures are presented in a group of five papers. The last section on space transportation includes an excellent overview of the design, development and flight experience of the space shuttle.

On the whole, the volume is interesting for general reading to get an appreciation of the current thinking on developments in space technology. Unfortunately, not many papers go into sufficient depth of the problems, analyses, design for the challenges posed and one feels that adequate justice is not done to the title of the volume.

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**Handbook of Soviet lunar and planetary exploration** Vol. 47, 1979, pp. 276, \$ 25.  
**Handbook of Soviet manned space flight** Vol. 48, 1980, pp. 474, \$ 35, by Nicholas L. Johnson, Science and Technology Series, American Astronautical society. Orders to Univelt, Inc., P.O. Box 28130, San Diego, Ca 92128, USA.

*"Mankind will not forever remain on Earth, but in the pursuit of light and space will first timidly emerge from the bounds of the atmosphere, and then advance until he has conquered the whole of circumsolar space"*, K. E. Tsiolkovskiy, 1911. Just half a century later this prophecy by the founder of the Soviet astronautics started turning into reality when Yuri Gagarin became the first man in space.

The first artificial satellite, the first man and the first and the only woman in space, the first space walk, the first probes to land on the Moon, Venus and Mars, the first space station, and the longest stay in orbit are a few of the long list of 'Firsts' to the credit of the Soviets. In just 20 years, 45 cosmonauts have completed a total of over 4 man-years in space. There have been more than 1300 known launches.

Unlike the Americans, the Soviets generally disclose very little about their mission and the spacecraft. Only brief statements following successful missions are made. The published reports/statements are seldom precise and accurate. Even less is known about the unsuccessful missions. Based on a careful scrutiny of hundreds of such reports and statements, and the analysis and conjunctures by Western observers, these two volumes attempt to present a systematic account of the Soviet space programme.

*The Handbook of Soviet lunar and planetary exploration* (Vol. 47) deals with the spacecraft Luna and Zond including Lunokhod used for the exploration of the Moon, Venera launched to study the Venus, and spacecraft Mars which were sent to the Mars. The discussion is divided into ten chapters, each dealing with one generation of spacecraft, their salient features, successes and failures.

*The Handbook of Soviet manned space flight* (Vol. 48) is devoted to the manned spacecraft from Vostok, which orbited Yuri Gagarin in 1961, through Voskhod to the latest version of Soyuz which took the cosmonauts to the Soviet space stations Salute. The 15 chapters systematically cover various generations of these spacecraft. Both the volumes also include a brief description of the Soviet launch vehicles, launch facilities and summary of the missions/systems as appendices.

In terms of technical details, the books include only the launch dates, orbit, mission sequence, overall dimensions, weight and broad mission objectives, if known. Where the mission objectives are not clearly known and for the missions that failed, the author has attempted to give a possible explanation based on available documents. Some subsystems/experiments are also described. A number of references are cited where one may be able to get more technical information.

The author has generally adopted a style which falls between those of a historian and of a news commentator. It should generally sustain interest of the reader except perhaps in some sections of the first volume.

The volumes are a welcome addition to the literature on space technology. It should be useful to the students of history of science and to the observers/analysts of Soviet science and technology.

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SHASHI KANT SHRIVASTAVA

**Microscopes and their uses** by Claude Marmasse. Gordon and Breach Science Publishers, New York, 1980, pp. 344, \$ 20.

Ever since Ernst Abbe gave, about a century ago, a scientific prescription for the construction of an optical microscope through his pioneering work of the theory of microscope vision, the science and art of microscopy have flourished and a great many fields of science and technology starting from Biology to Metallurgy have been immensely benefited by the advent of the wonderful instrument called the optical microscope.

A microscope or for that matter any instrument can either be properly used or grossly misused and it all depends upon the thoroughness of the knowledge that the user possesses about the instrument. In fact, the severity of this problem is more acute now than ever before ; because of the profound level of sophistication that the instrument making endeavours have reached now-a-days. It is in this context that the value of the book under review should be judged.

It is abundantly clear that Claude Marmasse, besides being an expert on microscopy, takes a holistic view about the use of a microscope ; for he considers for example the use of the condenser iris diaphragm to control the intensity of illumination a *cardinal sin*. Reading through the book one gets the impression that the microscope has become

an integral part of Marmasse's life and that he feels distressed to see it being improperly used. The book documents the appropriate use of microscopes for a variety of chosen applications and it is written with the user in his mind.

The attractive get-up of the book is very pleasing and the book is definitely a worthwhile addition to the library of all users of optical microscopes. A regular user of an optical microscope will know what he should not be doing and a new entrant to the field of optical microscopy will find in this book what he should learn thoroughly before he opens the cover of a microscope.

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S. V. PAPPU

**Experiments in engineering geology** by K. V. G. K. Gokhale and D. M. Rao. Tata McGraw-Hill, New Delhi 110 002, 1981, pp. 142, RS. 22.50.

This is an interesting book written by teachers of the IIT, Kanpur. The range of topics covered is very wide, consisting of sections on minerals and rocks, engineering properties of rocks, tests for natural aggregates, site evaluation techniques, and ground water investigations. Because of the wide range of topics covered the authors perhaps could not do full justice to all aspects. Some chapters are well treated e.g. Field descriptions of rocks (Ch. 3), Geological maps (Ch. 18), Pumping tests (Ch. 23); whereas some topics have been treated superficially with inadequate coverage e.g. Dynamic method of determination of Young's modulus and Poisson's ratio in the field (Ch. 8), Shear strength determination of rocks (Ch. 10), Size analysis (Ch. 11), and Use of electrical logs in site exploration (Ch. 32).

The 'Description of rock types' requires more elaborate treatment. The chapters on strength should contain an illustration of typical stress-strain characteristics, and typical values of strength. Shear strength (pp. 47-49) should be defined and the term 'cohesion intercept' should have been included in the text as well as in Fig. 10.3. Figure 10.2 is incomplete and requires better detailing. In the chapter on Size analysis, list of standard sieves and a typical figure on grain size distribution should have been included.

Chapter 19, on Remote sensing techniques in site evaluation is a welcome addition and Figures 19.4 to 19.7 are good illustrative examples.

The figures in some places are of disproportionate size (e.g. Fig. 21.1).

Although it is not indicated, the book will be useful primarily to undergraduate students in civil engineering.

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A. SRIDHARAN

**Dynamics in civil engineering** by Alexander Major. Published in 4 volumes by Akademiai Kiado, publishing house of the Hungarian Academy of Sciences, H-1361, Budapest, POB 36, Hungary, pp. Vol. I—302, Vol. II—320, Vol. III—291 and Vol. IV—306.

The present series of four volumes from the wellknown authority on machine foundations deal with the vibration problems faced by a designer in the field of civil engineering. The first three volumes give a comprehensive treatment of machine foundations and related dynamic problems. The fourth volume deals with dynamic problems arising in buildings, bridges and hydraulic structures. This volume contains an excellent bibliography and an index common to all the four volumes.

The first volume contains the basic problems of vibration analysis and the general principles of theory and practice of machine foundations. In addition, soil dynamics including soil-foundation interaction are comprehensively treated. There is information on instrumentation and vibration tolerances. Volume two contains a review of the machine types and a detailed treatment of the structural analysis and design of the various types of foundations for hammer, reciprocating engines and the problem of vibration isolation and damping. The third volume is concerned with the operating principles of the machinery and the structural details of the foundations of the high-speed types, especially of turbogenerators, which form the most important components both in thermal and in nuclear power stations. In volume four, vibration in buildings and industrial structures due to dynamic loads like wind, earthquake and blast loads, methods of protection against vibrations, vibrations of tall stacks, towers, hydraulic structures and bridges are discussed.

This set of four volumes achieves a well-balanced combination of existing theoretical knowledge, experimental results and practical details reflected from the extensive practical experience of the author. Each topic is explained by a number of numerical examples. The text is very clearly written. The information given is very valuable for designers and the set can serve both as a text-book and as a handbook.

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K. T. S. IYENGAR

**Cement chemistry and physics for civil engineers** by W. Czernin. Bauverlag GmbH, P.O. Box 1460, D-6200 Weisbaden, W. Germany, 1980, pp. 194, DM 54.

Concrete is currently used in greater quantities than any other man-made or processed material and hence it occupies the foremost place, in the broad spectrum of construction materials. With the order of over ten billion tons of concrete being processed and utilized in construction activity annually any book that enables to better understand the concrete making materials is a welcome addition to technical literature. The

book under review has a special place since it deals with cement which is the most important ingredient that make up concretes. In spite of the more advanced book *Chemistry of cements* by Taylor being available on this topic, this book is unique in its own right. The author has clearly stated that his basic aim is to offer the non-specialist reader some of the well founded information on the chemistry and physics of the cement in a readily understandable form and in a quantity suited to his requirements. This aim has been met with more than indicated. The book runs like a story and the treatment of the subject is excellent.

The book makes a very simple beginning with discussions on the principal raw materials used in the production of cements. Hydraulic hardening phenomena has been brought out well. In discussing the characteristics of portland cements the differences between hydraulic limes and cements are highlighted. The mode of setting of cement and the associated factors that affect hardening have been elucidated. Discussions concerning w/c ratios with particular reference to theoretical ratios highlight the significant role played by the same on overall strength of concrete.

The next aspect that has been dealt with is regarding the various possibilities and causes of volume changes in concrete. From the standpoint of durability, resistance of concrete to the action of aggressive chemical agents heat and frost have received due attention.

Alternative materials in the production of cement have been discussed. The type of materials discussed refer only to industrial waste materials. There are a host of other materials such as paddy husk ash that merit discussion. Although a brief discussion has been provided about admixtures for concrete, the superplasticizers have not received much attention. In fact, superplasticized concretes form concretes at the crossroads and its potential merited more detailed discussions. The treatment on fibre reinforced cements and concretes is totally inadequate and is inappropriate.

Notwithstanding some of the above mentioned deficiencies, this book is a valuable addition to the literature on construction materials. The author deserves high commendation for authoring this book. The reviewer recommends that all construction engineers and graduate students to get benefited by this book so vital to the field of concrete technology.

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