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B O O K R E V I E W

Acoustic Emission: Sources, Methods and Applications (in Polish), I. MALECKI and J. RANACHOWSKI [Eds.], Institute of Fundamental Technological Research, Warszawa 1994, 492 pp.

Acoustic emission (AE) is a phenomenon and a method as well. The investigations of this phenomenon, its sources, signals interpretation and their connections with the source character constitute a currently developing subject for research studies. The applications of AE as an investigation method are being developed faster. Ranachowski and Malecki's book introduces both aspects of AE. The book is set of twenty one articles written by different authors, arranged into seven parts.

The description of the phenomenon and its physics, signals and sources classifications are introduced in the first part. The following part of the monograph structure is based on a sequence introducing AE in terms of its application as a study of method. The chapters from second to sixth concentrate respectively on the applications of the AE method for ceramic materials, metals, metallic elements, concrete, wood, composites, and geological materials. The AE metod is used principally in pit-coal mines for "in situ" studies and also in the chemical technologies. The monograph introduces a very wide range of practical applications of the AE phenomenon.

The second part introduces one of the most important applications of AE, namely the possibility to estimate the strength and operating parameters of ceramic materials in the brittle crack process on the basis of AE signals. Also, studies of superconducting ceramics by the AE method are presented in this part.

The third part is devoted to the AE phenomena in metals. The main sources of AE in metals are dislocation migrations. The mechanism of these migrations is different for single crystals and polycrystals, and that is why both material groups are introduced separately. Since the metallic parts of the technical devices often work in chemically active surroundings, utilization of the AE method for studies of stress corrosion is especially effective.

The application of AE method for the investigations of heterogeneous materials is discussed in the fourth part. The AE application for studies of the multiple cracking process in these materials is described. The investigation of AE phenomena in geological materials is considered to be one of the first investigations of that kind.

The fifth part of the monograph introduces very interesting and not much investigated applications in building grounds, agriculture soils and geological

materials, particularly in pit-coals. It is worth while mentioning that both laboratory studies and the results of "in situ" investigations are introduced. Possibilities of applications to crumps forecasting in the pit-coal mines are described, along with ones in chemical processes, particularly in audiology. The studies of the AE method in respect to ears has proved successful, which gives unique information applicable in otolaryngology.

The sixth part describes AE applications for diagnostics of electrical power engineering devices. Such types of applications could be especially serviceable if optical waveguide transducers are used as AE signal receivers. The last part introduces a Polish apparatus for AE applications, its various modifications for specific applications, and standard sources of acoustic emission.

In summary, in the monograph the authors present the development of the application prospects of the AE method. They also suggested new research problems concerning both the applications of the method and the development of the methodology and apparatus. This variety of the introduced AE applications is a conspicuous feature of *Acoustic Emission: Sources, Methods, and Applications*. Each article is written by an expert on a specific problem and includes both a survey of the world literature, and especially the achievements of Polish researchers.

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K.U. INGARD, *Notes on Sound Absorption Technology*, Noise Control Foundation, Poughkeepsie, NY 12603 USA

We obtained new book "Notes on Sound Absorption Technology". This book has been written by Professor K.U. Ingard.

Professor K. Uno Ingard was educated at the Chalmers University of Technology in Gothenburg, Sweden and at the Massachusetts Institute of Technology in Cambridge, Massachusetts, USA.

He received the Ph.D. degree in physics from MIT in 1950 and joined the MIT physics department as an assistant professor in 1952, having previously served as the Director of the Chalmers Acoustics Laboratory. He became an associate professor at MIT in 1956, a professor in 1966, and in 1971, he was appointed to a dual professorship in the department of aeronautics and astronautics. He taught acoustics and noise control engineering in the aeronautics department and has research interests ranging from aeroacoustics and nonlinear acoustics to structural vibrations and flow-induced instabilities.

He has worked on a wide variety of problems in acoustics and noise control engineering for more 45 years as a consultant to various industries. He is the author of several books, among them "Theoretical Acoustics", "Fundamentals of Waves and Vibrations", "Linear Acoustic theory", "Introduction to Mechanics", "Matter and Waves". He has authored more than 100 papers related to acoustics and the physics of fluids.

The book has two parts. Part I covers sound absorption technology, part II gives many examples of the use of the computer programs.

The essential problems of book are:

— Fundamentals of sound and acoustics.
— The acoustical properties of flow-resistive screens.
— The effects of viscosity and heat conduction on sound propagation.
— Design of multi-layer sound absorbers, including non-uniform absorber spacing.
— The properties of flexible porous sound absorbers, including open and closed cell materials.
— Attenuation in lined ducts, including both locally reacting and nonlocally reacting liners.
— Resonator design, including scattering and absorption cross-section.
— Sound absorption in wind tunnels.
— Interactions between shock waves and flexible porous layers.
— Characteristics of sound absorptive materials, including a new apparatus for measurement of flow resistance.
— Measurement of complex compressibility.
— The theory of transmission matrices.

The text in sound absorption technology is accompanied by three high-density floppy disks. The disks contain 38 executable DOS programs for IBM-compatible computer which, with the text, allow the user to make a wide variety of calculations of the properties of structures which contain acoustical materials. I think, with the text and software provided a user is able to:

— calculate the acoustical performance of materials
— calculate the performance of acoustic-resonator
— calculate the absorption coefficient of flow-resistive screens
— determine the acoustical performance of multi-layer porous absorbers, the acoustical performance of perforated and wire screen layers.

I have only one minor criticisms. In book Professor Ingard does not present references. Two years ago J.F. Allard published a book "Propagation of Sound in Porous Media: modelling sound absorbing materials" (Chapman Hall, London). Professor Ingard's book is there for second publication connected with the acoustical properties of porous absorbing materials.

Text of this book is an important and exciting one and should be required reading for researchers, graduate students, consultants and designers interested in subject sound absorption technology.

Zbigniew Engel