

ultrasound, thermal injury evaluation by non-contact ultrasonic imaging are some of the papers in the section "Tissue Characterization". The section "Tissue Motion and Blood Flow" starts with a wavelet transformation application to characterize tissue and flow imaging, a heart wall vibration mode study, a method for real-time blood flow velocity vector imaging, three papers on what is related to Doppler images are covered. The section "Elastic Imaging" mostly concentrates on the imaging of elastic characteristics of tissues. Tissue elastic modulus distribution imaging, incompressible biological soft tissue's elasticity imaging, a method of reconstructing Young's modulus from freehand elastograms, elastic contrast detection, 2D transient elastography, and intravascular palpography are what appears. The section "Hard Tissue" introduces a study on mineralized tooth tissue, None imaging, and finally, the human femur ultrasonic tomography.

It is noteworthy that "Scattering by Blood and Tissue" introduces a modelling which can be applied for the characterization of red blood cell aggregation, frequency-dependent characteristics of backscattered signals by aggregating red blood cells, and 20 MHz backscattering measurements. The section "Medical and Biological Image Formation" has five interesting papers. These include what is related to acoustical holography for breast imaging, an imaging technique that might have an application to skin tumor diagnosis, and soliton imaging methods. The last section, "Novel and Emerging Methods" contains five papers addressing what is obviously likely to be the methods that will have some impact on acoustic imaging.

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ENCYCLOPEDIA OF VIBRATIONS, 2002, by S. G. Braun (editor-in-chief). D. J. Ewins and S. S. Rao (editors). London: Academic Press, 1595 pp. price £620, \$925 (three volumes, hardbound). ISBN 0-12-227085-1

With its three volumes and 1660 pages, the editors of the *Encyclopedia of Vibrations* have produced a substantial and important reference work for practicing engineers and researchers. With its numerous contributors, the *Encyclopedia* provides comprehensive coverage of topics concerning mechanical vibrations. The stated aim of the *Encyclopedia* is to "focus on aspects of interest to practicing and research engineers", and these aspects cover a broad spectrum of traditional, modern and interdisciplinary topics. In achieving this aim, the *Encyclopedia* goes further than previous references works.

The general scope of the *Encyclopedia* concerns mechanical vibrations interpreted in a wide sense. It covers aspects of more traditional vibration analysis, application and engineering. However, emphasis is also placed on more modern, interdisciplinary topics, such as active control, smart structures and signal processing, and on the use of computers for vibration modelling, identification and control. These topics are at the forefront of current research and developments in the field and have become important because of the enormous impact of computer-related technologies in recent decades. With this enlarged scope, the *Encyclopedia* offers a modern reference work for the vibrations engineer or for those with interests in the field.

Encyclopedias come in a variety of styles, depending on the form and length of the entries. Here, there are 180 or so articles, arranged alphabetically, the length of an article typically being 5–15 pages. This style seems very sensible, the length of a typical article allowing the topic to be developed in some depth, as is necessary. The reader is encouraged to navigate the *Encyclopedia* by use of internal cross-referencing, as well as the contents

and index pages. A glossary of terms is provided, together with seven appendices covering nomenclature, standards and so on. There are 55 colour plates. The strength of the *Encyclopedia* can be judged by the quality of those who have been involved: the three editors, the 20 expert members of the editorial advisory board and the 140 contributors to the *Encyclopedia*, all of whom are acknowledged authorities.

There are too many articles to list the titles individually. However, to give some flavour of the content of the *Encyclopedia*, the articles can broadly be grouped as follows. First, there is a group of 30 or so articles concerning the fundamentals of vibration, briefly covering material that is contained in a first vibrations textbook. A further 20-odd articles concern more advanced, but still traditional, material. Together, these articles summarize various aspects of the fundamentals of vibration theory, analysis and modelling, the behaviour of structural elements such as beams, plates and membranes, random vibrations, non-linear systems and so on. The remaining articles in general contain brief, review-type material, on more advanced and/more specific topics. It is here that the main value of the *Encyclopedia* lies, in the opinion of this reviewer. These articles fall broadly into the following groups:

Vibrations: specific applications (56): Many specific topics are considered, ranging from transport vehicles to bridges, packaging to tyres. A number concern machinery—bearings, gears, rotors, etc.—together with condition monitoring and diagnostics. Other articles concern fluids and structures, noise, earthquake engineering, fatigue and human effects. More general issues include modal analysis, model identification and model updating.

Experimental issues (18): Vibration instrumentation, shock and vibration measurement and testing, environmental testing. Experimental modal analysis. NDT; ultrasonics.

Numerical analysis and methods (12): Linear algebra and eigenvalue analysis. Finite element, boundary element and finite difference methods; software.

Signal processing (17): with a slant towards the processing of vibration signals. Digital signal processing: averaging, windowing, integration, etc. Spectral analysis; cepstral analysis; time–frequency methods. Digital filtering, optimal and adaptive filters. Transform methods (FFT, Hilbert, etc.). Neural networks.

Active control and smart structures (18): Active vibration control: isolation, damping, absorbers and applications to civil structures and vehicles. Hybrid control. Smart materials (piezoelectric, electrorheological, etc.), structures, sensors, actuators and applications; MEMS.

In general, the articles are of high quality and reflect the state of the art. This is especially true of self-contained articles or those that form part of a co-ordinated series concerning different aspects of a single, broader topic. However, there is some unevenness in style and depth, suggested “further reading” and so on. This particularly applies to those articles that present the more basic fundamentals of vibration theory, the stuff of textbooks, perhaps. One is left with a feeling of a lack of co-ordination of detailed content, with some repetition and omission of core material. Those most likely to refer to these sections would be the inexperienced reader or an expert working outside his field—perhaps introductory, overview articles would have helped to organize this material for their benefit. The range of topics covered is broad, but there is some unevenness in content. Issues covered only modestly at best include audio-frequency vibrational behaviour and structure-borne sound, NVH-related issues, active structural acoustic control and the dynamics of structures with uncertain properties (stochastic FE, reliability methods, fuzzy structures, fuzzy FE, etc.). The use of colour is welcome and more of the figures would certainly benefit from being in colour (e.g., time/frequency representation, mode shapes, etc.).

All books have a shelf-life, of course, and one can envisage significant advances in this field being made in the coming years. However, one can expect most of the content of the

Encyclopedia to remain of value for 10–20 years or more. Purchase also includes access to an on-line version of the *Encyclopedia* for a limited period, including permission to download material for classroom and other uses. The facility will not be available until 2002/3, however.

The acid test concerns who would use the *Encyclopedia* and whether it would meet their needs. Practicing vibrations engineers, experts looking outside their immediate specialism and new and established researchers with some background knowledge of vibrations will all find much valuable material in these volumes. The *Encyclopedia* is enjoyable for casual browsing, and valuable for deeper studies.

In summary, the editors, co-editors and contributors have performed a valuable service and should be congratulated for assembling a work of such substance. At £620/\$925 the *Encyclopedia* is not cheap, but provides 1600 pages in a two-column format: a substantial quantity of diverse, high-quality material in one source, that reflects the current state of the science and engineering of mechanical vibrations. The *Encyclopedia* deserves a place in all academic and specialist libraries.

B. R. MACE

MAPS — MECHEL'S ACOUSTICS PROGRAM SYSTEM, 2001, by F. P. Mechel. Stuttgart: S. Hirzel Verlag, Price €2800. ISBN 3-7776-1034-8 (Mac), 3-7776-1111-5 (Win)

This latest addition to the three-volume book on sound absorbers (Schallabsorber by F. P. Mechel, published previously by the Hirzel Verlag) furnishes ready-to-use numerical modules in the Mathematica[®] language implying that the user needs a license for either Mathematica version 2 or 3/4. Although MAPS was originally written on a Mac, the native language Mathematica is platform independent such that a PC-Windows version is also available. The numerical modules are organized in accordance with the layout of the book. This means that each module — termed notebook in the Mathematica environment — has a number or name corresponding to a chapter and section of the book. For instance, “I Chapter 9.9” refers to Chapter 9, section 9, in Vol. I, treating the radiation impedance. The modules encompass topics from all three volumes of which the first deals with the exterior sound field and its interaction with the absorber, the second treats the interior sound field of the absorber structure and the third handles applications such as flanking transmissions through suspended ceilings or silencers. In all, this means 340 modules totalling roughly 900 programmes. Also included as explicit routines are the necessary mathematical functions involved in the absorber applications. All “notebooks” are neatly structured in the same way beginning with a heading stating the topic and a sub-heading giving the particulars. The heading is followed by a brief description of the object of the notebook with reference to the details in the book. Also included are computational method, formulae and general remarks. After the description comes the “evaluation group” containing the general set-up for Mathematica options, load commands for required Mathematica routines, standard properties of the fluid, defaults for line types and sub-routine declarations. This evaluation group is important and must be executed prior to other computations. Subsequent to the evaluation group are the numerics, computing the output, presenting the output in different ways and establishing blocks in a compound procedure. The numerics generally begin with an “Input” section. Here, the analyst may alter and specify variables and parameters to suit the problem in hand. All MAPS routines are equipped with a default set for the input realizing a template output. Most commonly, the result or the output of a computation is a diagram. This is augmented by some text