Formulas of Acoustics
F. P. Mechel, Editor
Springer-Verlag Berlin, Heidelberg, New York (2008)
1275 pp., 319 USD, ISBN 978-3-540-76832-6.

My desk is loaded by an additional 1.8 kg (equivalent to 4.1 lbs) resulting from the 2nd edition of "Formulas of Acoustics" by F. P. Mechel his co-authors published in the Springer-Reference series. Since 2004 the first edition was out of print encouraging the authors and the publisher to go for a new edition. Due to the thorough work by all authors prior to the 1st edition, only minor corrections have been necessary. Just a single sub-section was up for major improvements marked by an asterisk in the contents but no errata notations are provided with respect to the 1st edition.

In 17 chapters the book cover numerous areas of classical contemporary acoustics: Some are solely authored by F. P. Mechel: general linear fluid acoustics, equivalent networks, reflection of sound, scattering of sound radiation of sound, porous absorbers, compound absorbers sound transmission, duct acoustics and capsules cabins. Other chapters have another primary author: muffler acoustics (by M. L. Munjal), room acoustics (by M. Vorlaender), flow acoustics (by P. Koeltzsch), analytical numerical methods in acoustics (by M. Ochmann), variational principles in acoustics (by A. Cummings), elasto-acoustics (by W. Maysenhoelder), and ultrasound absorption in solids (by W. Arnold). Each chapter concludes with a rather extensive reference list. Also I noted that the chapter on "Nonlinear Acoustics" appearing in the 1st edition is not found in the 2nd edition.

Within each chapter the formulas are derived presented with strict focus on the problem to avoid excessive explanations found in books for educational purposes. One could consider "Formulas of Acoustics" being the abbreviated version of Mechel's three volume series "Schallabsorber" published in German only (with 2866 pages 5.5 kg in the whole). This series which was acknowledged to be the "Bible of Sound Absorption Sound Absorbers" the "Formulas" book benefit from Mechel's rigorous mathematical approach to acoustical problems often considered not amenable to formal calculation or "to calculability." No wonder that empirical approaches are avoided except the inevitable material data required to perform the actual calculations (e.g. airflow resistivity or impedance of absorbing materials).

Computational aspects are treated in each chapter leading to—mostly complex—analytical formulae or approximate numerical formulae in case of integral functions. Some chapters however provide information beyond that of just stating a problem presenting its solution. The chapters "Room Acoustics" by Michael Vorlaender "Analytical Numerical Methods in Acoustics" by Martin Ochmann give detailed explanations of procedures to approach a problem with example calculations leading to contemporary ray tracing techniques, BEM- and FEM-methods and actual programming aspects.

Some editorial remarks: Besides "Figure 1" on page 10, all figures in the entire book are not numbered. The book's text does not therefore in all cases establish a clear reference to the figures which sometimes makes it hard to evaluate their relation to the appropriate formulae. Furthermore, the figures captions are printed in a similar font and size as is the chapter's text. In some cases, captions are missing completely with reference being made just in the chapter's text. In a book by a world-renowned publisher of scientific literature such as Springer Science+Business Media, these kinds of short-comings should not be present in a work as important as this.

With regard to the chapters by contributing authors it is irritating that the list of contents states several chapters have a single author (e.g. chapter N, "Flow Acoustics" by Peter Koeltzsch, and chapter P, "Variational Principles in Acoustics" by Alan Cummings), while the sub-titles of the respective chapter's state "with P.Koeltzsch" and "with A. Cummings." This holds in a similar way for all chapters having co-authors: This "with" implies the "real author" was F. P. Mechel and he had help from the co-contributors. As a reader, one would appreciate to know in either case what is correct with respect to the original authorship.

Furthermore, a comment on the book's index. There are two kinds of indices: One for each chapter separately and another for the entire book. With double appearances of keywords, it is not evident what to find where. As I do this kind of work myself as well—setting up a book's index—I know that it requires an in-depth knowledge of the subject and of the information dealt with in order to develop a proper index. The present indices—though being numerous—give the impression of not having been compiled by the authors themselves. The publisher seems to have done his/her best—it could, however, been done better.

Despite these editorial drawbacks the book is a "must" for all those working with or in engineering acoustics and not willing to develop all fundamental

and advanced mathematics themselves—as far as the subject is being treated here at all. So, this book deserves surely more than a casual glance at the title leaving the question unanswered whether "formulas" or "formulae" is considered to be correct English.

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