



BOOK REVIEWS

ROOM ACOUSTICS (fourth edition), 2000, by Heinrich Kuttruff. London and New York: Spon Press, xii + 349pp. Price £95.00. ISBN 0-419-24580-4

Books presenting the theory behind a scientific discipline are hardly going to be best sellers, but it is gratifying that they remain within the economic realities of publishing. (The same sadly cannot be said for reprints of good books on building acoustics for architects). It is particularly welcome to have a fourth edition of Heinrich Kuttruff's "Room acoustics". The first thought of readers familiar with earlier incarnations may well be: when did the first edition appear? The answer is a remarkable 1973. This is a book which has retained its basic structure but has on each occasion been more finely honed; this latest edition is no exception.

As before, thanks to the excellent spoken English of the author and the assistance of Peter Lord, the text has a maturity and reads like that of a native English speaker. One of remarkably few slips may bring a smile to some lips: the use of the word monotonous in place of monotonic (p. 205)! The text also includes valuable sentences structuring the argument, placing flag poles or warning the reader how much more of the mountain remains to be climbed. But there are comments that could have been made about earlier editions.

As many readers will already be familiar with an earlier edition of Room Acoustics, a major question concerns what is new. Following sales within the publishing business, the imprint has changed, as has the look of the cover. The paper on which the text is printed is whiter and of better quality than before. Gone are the clumsy Roman numerals used for the chapters and figures, etc.; this is one of a sequence of small changes that contributes to an improved layout.

There is an inherent logic about the order and subject of each chapter, with remains the same as before. Some chapter titles have been slightly altered though. But a host of small changes can be found since the third edition to clarify individual points or improve the flow of the argument. The references listed at the end of each chapter are now peppered with new publications from the 1990s.

Chapter 2 has been renamed "Reflection and scattering", responding to the recent interest and progress in the understanding of scattering by profiled surfaces. This topic is further elaborated in Chapters 4 and 8. Chapter 4 now also has a section on reflection from curved surfaces.

Chapters 3–5 tackle the three theoretical approaches to sound in rooms: wave theory, geometrical and statistical acoustics. The last of these, Chapter 5, is mainly concerned with reverberation and covers in some detail the basic issues of linear or non-linear decays and the relevance of diffuse sound fields to theoretical behaviour. It is refreshing to see so many different approaches used to deal with these questions. Compared to previous editions it is particularly welcome to find an extended summary of the author's own work on reverberation behaviour in spaces with non-uniform distribution of absorption. This condition is in fact the norm in auditoria and many other spaces.

Chapter 6, which summarizes current knowledge on sound absorption, now includes a discussion of absorption by Quadratic Residue Diffusers. The new absorption figures from Beranek and Hidaka are given for absorption by audience and other common materials in auditoria.

Chapter 7 turns to the subjective aspects of sound in rooms. Here the author warns us of a more difficult terrain now that we have left the realm of purely physical acoustics. Rightly the new thinking on spatial hearing has been added, that we can hear two effects: source broadening and listener envelopment. This chapter provides a valuable summary of current thinking on subjective acoustics, perhaps particularly valuable because the author has been more of an impartial observer than a participant in this area.

Chapter 8 on measuring techniques has and no doubt will be much appreciated by all those involved in acoustic measurements in rooms. For instance, this is the place to find how to convert the normal incidence absorption coefficients measured in a standing wave tube into random incidence coefficients, provided that the material can be assumed to be locally reacting. In the author's preface he mentions the continuing changes in techniques resulting from the "triumphant progress of the digital computer". This has resulted in significant revisions to this chapter, including a major extension concerning new proposals for the measurement of scattering coefficients.

Following the theoretical treatment, the next chapter is concerned with design considerations mainly for auditoria. The author's experience of the real-world shows through when he writes: "Unfortunately these principles can only be applied to a limited extent to theatres, where such measures could in fact be particularly useful. This is because the stage is the realm of the stage designer, of the stage manager and of the actors; in short, of people who sometimes complain bitterly about the acoustics but who are not ready to sacrifice one iota of their artistic intentions in favour of acoustical requirements!" An interesting conclusion is to be found concerning the difference between spaces for speech and music. For good music acoustics, "the requirement of strong lateral reflections favours quite different room shapes than the requirement of strong direct sound"; the latter being appropriate for speech. In line with progress related to computers, the section in this chapter on computer simulations has been extended to include both the ray tracing and image sources methods. A new section on auralization has also been added.

The final chapter on electroacoustic systems in rooms has also been brought up-to-date with a discussion of waveform synthesis.

I do have two general quibbles. Firstly, can I campaign for references to include full page numbers and titles? For those with a well-stocked university library on hand this presents no problem, but many readers will not be so lucky and may need to decide whether to request copies of articles. My second disappointment concerns the cover design, which though fine from a distance contains a remarkably banal image, so banal that on the front it is duplicated. Surely at the price this book sells for, a little more effort on cover design could have been made.

These though are no more than quibbles. This is a book that all working in room acoustics will want to read or refer to and this edition, even more polished than its predecessors, is most welcome.

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LES PHÉNOMÈNES D'ONDES DANS LES MOTEURS, 2000, by Michel Borel. Paris: Editions Technip. 341pp. Price 640FF, EUR 97.57 (hardback). ISBN 2-7108-0778-5 (In French).

This book is a *Publication de l'Institut Français du Pétrole* and as such one might expect another book aimed at engineers working with internal combustion engines. This inclusion of IC engines in the title reinforces this expectation.

However, this book is rather different. The author states his aim of promoting understanding of the natural processes of wave action in the intake and exhaust systems of IC engines. He