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.

M. Barron

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 Francais du Petrole* 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

undertakes this by first presenting a 1-D linear acoustic analysis of the wave action and then concentrating on various forms of the method of characteristics (MOC). He acknowledges that the MOC has now been superseded by other numerical schemes for the solution of the 1-D equations of fluid motion, but makes the case that the use of separate positive and negative going wave-like components in the MOC aids the understanding of wave action.

The book is focussed solely on wave action, and pays most attention to the mathematics of the problem rather than the description of the physical process itself. As a result, there are no diagrams of engines or intake or exhaust systems in the book, and the practical concerns of optimizing engine breathing whilst controlling noise are hardly discussed. Notwithstanding this, the book will be of interest to those seeking a deeper understanding of wave action in ducts in general, an understanding that can subsequently be applied to IC engines in particular.

Chapter 1 sets out the governing equations of 1-D fluid motion. The notation used is clear and will be familiar to most readers.

Chapter 2 presents an acoustic analysis of the 1-D fluid motion. First the equations of motion are linearized. Then a general solution in the form of positive and negative going pressure and particle velocity is discussed. Later, the linear plane wave equation is derived, and the propagation of sound across simple discontinuities in the duct is analyzed. Acoustic impedance is discussed. The analyses in Chapter 2 is simple, which does aid rapid progress through the material, but also rather oversimplifies the problem by neglecting the influence of mean flow and temperature gradients.

Chapter 3 presents the foundations for the MOC along with instructions on how the graphical MOC can be used to solve the equations of fluid motion at a point for a simple wave making the homentropic assumption. The presentation style is clear, although the material may be found in other texts written before the demise of the graphical method brought about by the advent of popular computing.

Chapter 4 expands the use of the graphical MOC to deal with the interaction of many waves in a duct and the interaction with thermal discontinuities. Two simple boundary conditions are considered, these being the open and the closed end. The homentropic assumption is still retained.

Chapter 5 discusses the formation and propagation of single shock waves and Chapter 6 expands this to the interaction between several shock waves. Three simple boundary conditions are considered, these being the open end, the closed end and the thermal discontinuity.

Chapter 7 is a short chapter that considers the general form of the MOC and briefly discusses the main problems to overcome in developing a numerical rather than graphical MOC.

In summary, this reviewer found the book to be a clear treatment of a particular approach to modelling wave action in ducts that should promote a deeper understanding of wave like behaviour in readers fairly new to the subject.

M. F. Harrison

FLOW-INDUCED VIBRATION, 2000, by Samir Ziada and Thomas Staubli (editors). Rotterdam: A. A. Balkema, xvi + 846pp. Price £83.00, US$ 125·00, EUR 125·00. ISBN 90-5809-129-5

This book is the Conference Proceedings of the FIV-2000 International Conference held at Lucerne Switzerland, June 2000. It's 846 pages contain 106 papers on structural vibration and acoustics in fluids by 222 authors from 20 countries. All of the papers have been reset in