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Book Review

Book Review David A. Bies and Colin H. Hansen: *Engineering Noise Control, Theory and Practise*, 3rd edition, Spoon Press, London/New York, 2003.

Engineering noise control is characterized by the variety of possible applications and the complexity of the problems encountered. The practitioner rarely builds a full mathematical model of the structure of interest, since this would be time consuming and costly, if not impossible. Instead, the problem is analyzed by measurements and simplified calculations and the important sources, transmission paths, and disturbing responses are identified. Idealized models that capture the important aspects of the physics are built and, based on the understanding gained, measures for improvement are suggested.

This, by no means simple, procedure requires vast experience and a powerful collection of measurement, analytical and semi-analytical tools. Much of this is provided in ''Engineering Noise Control,'' which now appears in its third edition.

The book broadly divides into three parts: first, the perception and quantification of noise; then, sound sources and sound propagation and, finally, noise reduction. Chapter 1 is entitled ''Fundamentals and basic terminology'' and this chapter is a must-read, also for those that will use the many solved examples for reference. Among other things, sound level is defined and it is revealed that the book is not for the weak-hearted who fears to evaluate the logarithm of 1 Pa^2/Hz. Chapter 2 describes the anatomy of the ear, the perception of noise, and hearing damages. Chapter 3 then introduces acoustic instrumentation, such as microphones, tape recorders, sound level meters, dosimeters, and sound intensity analysers. The authors share their experiences in using this equipment and emphasize the importance of calibration. This part of the book is concluded with an extensive chapter on criteria for assessing the severity of noise, which is supplemented with a useful list of acoustic standards at the end of the book.

The next part of the book deals with sound generation and sound fields, starting off in Chapter 6 with elementary sources: ranging from monopoles via quadrupoles to incoherent plane radiators. The chapter continues with reflections at interfaces between different media and ground reflections, finishing with a section on outdoor sound propagation, including meteorological effects. Chapter 7 is one, of three, chapters with ''sound power'' in its title. It starts off with definitions of radiation impedance and near field and far field and continue with procedures for the measurement of sound power from general sources, making valuable references to standards. Chapter 8 is entitled Sound in Enclosed Spaces and provides the basics of room acoustics and some material on sound absorption.

The following three chapters are on noise control: one on partitions, enclosures and barriers, one on mufflers, and one on vibration control, including fundamentals of vibration isolation, vibration absorbers and attached damping materials. Chapter 10 also briefly discusses vibration measurements.

Chapter 11 provides an extensive list of semi-empirical formulas for the estimation of sound power generated by a great variety of sources. These formulas are mostly motivated by reference to a scientific article, a standard or a technical manual, while not much explanation is provided. Chapter 12, finally, introduces active noise control. The Appendices provides a derivation of the wave equation, an account of the properties of porous materials, and a brief introduction to signal analysis. The book is supplemented with comprehensive lists of references and acoustic standards.

Everyone engaged in the art of engineering noise control will benefit from this rich book. It would require hard work to select material for teaching but it seems do-able. However, many students that today aim for a career in noise control will sit by a computer running some extremely sophisticated software. I believe these students would gain more from a book focused on the physics of vibro-acoustic motion and fundamentals of math and mechanics. Nevertheless, these students would also gain by sharing the authors' experiences in noise control and by the book's brisk DIY attitude, showing that it is indeed possible to reduce the disturbing noise that surrounds us.

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