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Book Review Open Access

Book review on "Noise and vibration control" by M.L. Munjal and B. Venkatesham

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Noise and Vibration Control
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"*This unique compendium stresses on physical concepts and the applications to practical problems*", begins the blurb of this textbook. It addresses noise and vibration control to undergraduate students and engineers in practice with a focus on industrial and automotive applications. In the current second edition, three chapters have been added on acoustic measurements, sound transmission through media, and computational acoustics. The book is indeed a compendium since it covers all aspects of noise and vibration control in a concise manner. This makes the textbook a suitable companion for undergraduate students in engineering courses and engineers for self-study. Many examples with detailed solutions illustrate practical applications. In addition, problems are given at the end of the chapters to repeat and deepen the content. The amount of examples not only helps to understand the presented concepts but can also inspire practitioners looking for solutions to noise control engineering problems. Readers who want to delve deeper into the underlying theory can refer to the references that are given at the end of each chapter. The textbook comprises 9 chapters, which contain the following: Chapter 1 introduces the fundamental concepts of wave propagation, decibel scales, and some fundamental psychoacoustic metrics. I think the latter is important for students and practitioners to understand that sound has many features and that reducing sound pressure levels is often not the only goal in today's noise control engineering tasks. Furthermore, the section on noise limits in India could also be interesting for readers from other countries if they are interested in the commonalities and differences in noise regulation around the world. Chapters 2 and 3 deal with noise and vibration measurements. While Chapter 2 focuses on transducers and measurement methods, Chapter 3 covers some fundamentals of vibrations of discrete and continuous systems before the main measurement techniques are briefly introduced. It follows Chapter 4 on the control of vibration, which aligns with the authors' approach of reducing noise at the source. These sources, they say, are often vibrating surfaces, e.g., of machines. In Chapter 5, sound transmission through multiple media and the measurement techniques to measure the sound absorption coefficient and the sound transmission loss are introduced. Basic concepts of room acoustics, such as reverberation time, are introduced in Chapter 6 to apply them subsequently to the acoustic design of noise barriers and encapsulations. The content of this chapter is sufficient for a compendium on noise control engineering. Room acousticians will miss a lot of content, but this is out of the scope of this textbook. Chapter 7 introduces electro-mechanical analogies and the transfer matrix method to model mufflers and silencers. It gives many examples of design variations and illustrates insertion loss and transmission loss calculations. "*prevention is better than cure!*" is the motivation of Chapter 8. It deals with strategies for noise control engineering starting at the source, where noise control is most cost-effective, as the authors say. Several simple formulas and reference tables are presented to estimate the noise of numerous different machines such as fans, electrical machines, pumps, etc. Nevertheless, Chapter 8 also gives some valuable hints to reduce noise propagation, protect

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receivers from noise, and control noise in an existing facility. Finally, Chapter 9 covers computational acoustics. The finite element method, the boundary element method, and statistical energy analysis are briefly introduced as numerical methods to solve acoustic problems. Further, acoustic boundary conditions, fluid-structure coupling, and the numerical modelling process are discussed. The chapter ends with a short introduction to aeroacoustics. Compared to the previous chapters, where many practical examples are shown, Chapter 9 is a rather general introduction to the topic without applications. It is a valuable summary of state-of-the-art computational methods and an overview for those who get in touch with computational methods in acoustics for the first time. Further reading is, however, necessary before one can apply these methods to academic or industrial problems.

In summary, "Noise and Vibration Control" by M.L. Munjal and B. Venkatesham is a compendium in the literal sense of the word (cf. Latin *compendium*: advantage, short path). Its advantage is that it covers the topic concisely and completely; it is a short path for undergraduates in engineering courses and practitioners to familiarise themselves with the fundamental concepts and state-of-the-art methods in noise control engineering.

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