The book "Fundamentals of Sound and Vibration (2^{nd} Edition)" is a hardback book edited by Frank Fahy and David Thompson, from the University of Southampton in the UK. The book has 490 pages plus an index, a preface, and a short bio of the contributors (26 pages). It is published by the CRC Press, a member of the Taylor & Francis Group. Editors have united the work of seven professors, one senior lecturer and one consultant and part-time teacher at the Institute of Sound and Vibration Research (ISVR). The contents of the book are roughly the contents of the first semester of a Master's course offered at this internationally recognized center of excellence in sound and vibration. Therefore, the book is naturally very coherent and offers the basis for a novice in the field of vibration and noise with a background in engineering, physics, or mathematics. Being the result of an effort of many authors, the Editors recognize that the book lacks the uniformity of style and consistency of notation of a single author's book. However, being written by experienced professors teaching in the same institution within the framework of the same Master's course, there is a natural consistency of the approach and the chapters give a very complete covering of the subject.

The short bio of the contributors at the beginning plays the role of complementing the introduction that follows. The reader can appraise the large experience of the contributors in research, teaching and consulting in the field of sound and vibration. The Editors have chosen not to use the word acoustics in the title for acoustics is a very broad field of knowledge, while the book aims at giving the reader basic knowledge for the measurement and control of vibration and audible noise. The introduction delimitates the scope of the book and gives the reader the motivation for approaching this fascinating field, its tools, applications, and open challenges. Although being a classical discipline, with well-established methods, there is still a need for well-instructed specialists to tackle problems such as building noise and vehicle noise and vibration, which affect our daily comfort and safety.

Chapter 2 provides an introduction to physical acoustics presenting the wave equation in one and three dimensions from basic principles. After reviewing basic concepts of harmonic amplitude and phase and the decibel scale, simple and illustrative examples such as the piston excitation of a tube are given. Basic sound metrics are presented and ideal acoustic sources and their directivity are discussed. Finally, an introduction to sound in enclosures ends the chapter. This chapter, as all the others, finishes with proposed questions and suggestions for further reading, which can be very helpful, as the book may be seen as a guide through the field of sound and vibration for beginners.

Chapter 3 presents the fundamentals of linear vibrations for lumped mechanical systems and briefly introduces continuous systems and waves in solids. Starting from Newton's second law, energy conservation, linear momentum conservation and impulse of a force, second order ordinary differential equations for one degree of freedom mechanical systems with springs and pendulums are obtained and analyzed. Free and forced vibrations are treated and the concept of Frequency Response Function is introduced. Damping and transient responses are discussed. After deriving a two-degree-of-freedom mass-spring system matrix equation, the N-degree-of-freedom equations are written and the modal decomposition is addressed. In all the cases treated the inverse problem of parameter estimation from the responses is discussed. The vibration absorber concept is presented. Continuous systems are introduced using the bar problem with the partial differential equation of equilibrium derived using Newton's laws. The free vibration solution is obtained and the concept of orthogonal mode for a continuous system is introduced. Then, the Euler-Bernoulli beam equations are given without derivation. The possibility of formulating the continuous system vibrations as propagating waves, as it was done with fluids in the previous chapter, is only commented. This is a topic that could have been extended a little, but further reading is recommended that allows the student to do it. Some problems are proposed.

Chapter 4 addresses the fundamentals of signal processing based on Fourier analysis. First, the classification of signals is discussed. Then, the Fourier series and integral and their properties are presented, leading to windowing, the uncertainty principle and the Hilbert transform. After discussing the effect of sampling, the Discrete Fourier Transform is presented and the radix-2 Fast Fourier Transform (FFT) algorithm is introduced. The analysis of periodic, transient, and random signals follows. After introducing basic statistical concepts such as probability density functions of a random variable, statistical moments, stochastic processes and ergodicity, covariance and correlation and power spectral density functions are defined. Input-output relations for linear systems are formulated leading to auto and cross spectra, FRF estimators, coherence functions, and estimator bias and random errors. A few problems and references for further reading close the chapter.

Chapter 5 uses all the basic concepts introduced in the three previous chapters to discuss noise control issues. This is a more technical and informative chapter. It starts with noise sources (aeroacoustic and mechanical) and the notion of acoustic efficiency and directivity. Then, it proceeds with noise source quantification measurement methods (free and reverberant field and intensity-based methods). Methods to tackle noise control problems such as transmission path analysis, including structure-borne and airborne paths, are briefly explained. Basic concepts of sound radiated from vibrating structures such as radiation from simple sources, Rayleigh's integral, and critical frequency for bending waves are presented. Sound transmission through partitions is then addressed for normal and diffuse incidence. Noise control enclosures and sound absorption are treated, the latter in a brief and conceptual way, which is appropriate for an introductory book. Some "practical" suggestions for sound attenuation using porous layers in front of cavities and Helmholtz resonators are presented, as well as micro-perforated panels and duct attenuators. Impedance tube and reverberant room absorption measurement methods are briefly exposed. Finally, vibration attenuation strategies for noise reduction are discussed, including impedance mismatch, damping, constrained layers, and adding stiffeners. Conceptual questions and a long list of references and ISO standards are given at the end.

Chapter 6 and Chapter 7 deal with the human response to sound and vibration, respectively. These are informative chapters, basically without equations and based upon experience, references, and standards. Abundant literature is cited in both chapters. Chapter 6 starts with information about the anatomy of the auditory system leading to sections on auditory capabilities (thresholds of hearing, equal loudness contours, and averaging methods) and hearing damage risk. Comfort metrics related to speech interference, sleep disturbance and annoyance are discussed. The issue of sound quality and psychoacoustics is not directly mentioned, but some of its concepts, such as loudness, are indirectly treated. A mention to the subject and a few basic references on this very important field of acoustics could have been made here. Chapter 7 deals with the effects of vibration on the human body. It introduces concepts like biodynamics and biodynamic models and discusses the issues of vibration discomfort and the influence of vibration frequency, direction, duration and magnitude. The effects of vibration on vision and on manual control are discussed. Disturbance caused by machinery and buildings is addressed. Whole body vibration exposure and motion sickness as well as the important issue of hand transmitted vibration and its health effects are discussed in the light of existing standards and EU directives. There are no proposed questions for these two chapters.

Finally, two chapters on experimental measurements of sound and vibration close the book. Chapter 8 treats the measurement of audio-frequency sound in air, while Chapter 9 treats vibration tests. Frank Fahy, one of the fathers of sound intensity measurements, opens Chapter 8 with a historical account of the developments in the field. The chapter goes from basic condenser microphone configurations to conditioning electronics up to Transducer Electronics Data Systems (TEDS). Calibration and microphones for special applications are discussed, as well as modern tools such as microphone arrays for acoustic imaging and particle velocity sensors. Sound intensity measurements are explained in more detail and based upon equations. The chapter ends with a brief discussion of applications. References are given on measurement techniques and ISO standards. Chapter 9 discusses measurement setups for vibration tests, sensors and actuators and their working principles, as well as practical use hints such as the suspension of structure and shaker in a vibration test. Transient, periodic and random excitation signals are discussed aiming at estimating FRFs. The chapter ends with a few references.

As a whole, this book is a good starting point for students and professionals approaching the field. It will also be helpful to professors worldwide responsible for organizing undergraduate and introductory graduate courses in this field. It is quite self contained and can be used as the main textbook for a one semester undergraduate or initial graduate course. Is gives a broad idea of the field, from basic principles to applications, standards, and experimental techniques. For researchers in the field of sound and vibration, it is a very interesting glance into the approach used by a world class institute to motivate and educate students in this important field of knowledge.

José Roberto F. Arruda