Fundamentals of Physical Acoustics

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Abstract: This book is an excellent piece of work. The text is extremely clear and goes a long way towards meeting the declared pedagogical target. The author has written a comprehensive text. The proportions of equations and explanations/interpretations are particularly well balanced. Throughout the book, the context and the validity domain for any equation derived are clearly stated. No doubt this book will be of invaluable help for students, academics and engineers. The structure of the book has a peculiar recursive pattern. Several topics are treated in each chapter, but these topics are the main subjects themselves of subsequent chapters (which can sometimes be found after several intermediate chapters). Although this means that the author returns to a subject more than once, no impression of redundancy comes out from the reading. This is due to a careful choice of the examples and the different angles from which the problems are viewed. The way in which the book is structured has a beneficial effect and undoubtedly participates in enhancing the pedagogical content. Essentially, each subject is treated in detail several times, thus giving the reader the opportunity to assimilate the concepts while still progressing in their discovery. Moreover the presentation and the layout of the book are excellent.
Sound is an oscillation of pressure transmitted through a gas, liquid, or solid in the form of a traveling wave, and can be generated by any localized pressure variation in a medium. An easy way to understand how sound propagates is to consider that space can be divided into thin layers. The vibration (the successive compression and relaxation) of these layers, at a certain velocity, enables the sound to propagate, hence producing a wave.

The speed of sound depends on the compressibility and density. Fundamentals of Physical Acoustics is intended for a two-semester, first-year graduate course, but is also suitable for advanced undergraduates. Emphasis on plane waves in the first part of the book keeps the mathematics simple yet accommodates a broad range of topics: propagation, reflection and transmission, normal modes and simple waveguides for rectilinear geometries, horns, inhomogeneous media, and sound absorption and dispersion. The second part of the book is devoted to a more rigorous development of the wave equation, spherical and cylindrical waves (including the more advanced mathematics).