

Introduction

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Acoustics is the science of sound. The term sound is used in two meanings, it refers to (1) an acoustic wave – mechanical vibration propagated through an elastic solid, liquid, or gas, (2) the sensation produced by stimulation of the ear by an acoustic wave. Both aspects of sound, physical and perceptual, fall within the scope of acoustics and are important for *Multimedia*. A person dealing with sound in *Multimedia* has to know how sounds are produced, how they travel through the medium, how the physical properties of sound are related to the characteristics of the auditory sensation perceived by the listener, and how the acoustic signals captured by the ears are processed in the human mind to obtain various kind of information about the listener's environment.

Acoustics is an interdisciplinary field as its scientific scope is concerned with physics, electrical and mechanical engineering, architecture, audiology, psychology, physiology, neuroscience, and the art of music. Acoustics is subdivided into various branches, but only some of them address the problems of *Multimedia*. *Multimedia* is closely related with physical acoustics, musical acoustics, psychoacoustics, electroacoustics, speech production and recognition, and architectural acoustics. Other branches of acoustics, such as linear and nonlinear physical acoustics, noise control, shock and vibration, underwater acoustics, physiological acoustics, acoustical measurements and instrumentation have very little, if at all, scientific relevance to *Multimedia*. Having this said, it should be noted that those who prepare any kind of educational materials on acoustics for *Multimedia* are confronted with difficult decisions as to the selection of topics.

The following eight parts, from *Basics of Physical Acoustics* and *Sound Propagation in Rooms* through *Auditory Perception* to five chapters on *audio recording* and *audio technology* cover different aspects of acoustics relevant to a variety of technical and artistic problems encountered in *Multimedia*. *Basics of Physical Acoustics* explains the elementary physical phenomena underlying the production of acoustic waves by various kinds of sound sources and propagation of sound through the air to the listener. *Sound Propagation in Rooms* represents a more technically advanced approach. This part discusses the propagation of sound in enclosed and open spaces and explains how to obtain proper sound quality in speech communication, social activities, live performance and reproduction of music, and in situations where sound is combined with vision and other non-auditory elements in *multimedia art*. *Auditory Perception* covers various aspects of sound perception and explains how acoustic waves are captured by the ears from the environment, pass through the auditory system, and encoded into electrical neural impulses transmitted to the brain. This part also describes the basic relations between the physical and perceived characteristics of sounds, discusses basic cognitive processes of listening, and explains the fundamentals of spatial hearing. Technological chapters: *Basics of Audio Recording*, *Sound Synthesis*, *Speech Synthesis*, *Sound Postproduction Workstation Programming*, and *Signal Acquisition and Filtering* provide essential information on certain aspects of technical work with sound in sound recording studio also needed for those who are interested in projects in *Multimedia*.