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Quantities"; "2.3 Wave Phenomena"; "2.3.1 Spherical Waves"; "2.3.2 Plane Waves and the Wave Field in a Tube"; "2.3.3 Wave Propagation in Solid Materials"; "2.3.4 Reflection, Absorption, and Refraction"; "2.3.5 Scattering and Diffraction"; "2.3.6 Doppler Effect"; "2.4 Sound in Closed Spaces: Acoustics of Rooms and Halls"; "2.4.1 Sound Field in a Room"; "2.4.2 Reverberation"; "2.4.3 Sound Pressure Level in a Room"; "2.4.4 Modal Behaviour of Sound in a Room"; "2.4.5 Computational Modelling of Closed Space Acoustics"; "Summary"; "Further Reading"; "References"; "Chapter 3 Signal Processing and Signals"; "3.1 Signals"; "3.1.1 Sounds as Signals"; "3.1.2 Typical Signals"; "3.2 Fundamental Concepts of Signal Processing"; "3.2.1 Linear and Time-Invariant Systems"; "3.2.2 Convolution"; "3.2.3 Signal Transforms"; "3.2.4 Fourier Analysis and Synthesis"; "3.2.5 Spectrum Analysis"; "3.2.6 Time-Frequency Representations"; "3.2.7 Filter Banks"; "3.2.8 Auto- and Cross-Correlation"; "3.2.9 Cepstrum"; "3.3 Digital Signal Processing (DSP)"; "3.3.1 Sampling and Signal Conversion"; "3.3.2 Z Transform"; "3.3.3 Filters as LTI Systems"; "3.3.4 Digital Filtering"; "3.3.5 Linear Prediction"; "3.3.6 Adaptive Filtering"; "3.4 Hidden Markov Models"; "3.5 Concepts of Intelligent and Learning Systems"; "Summary"; "Further Reading"; "References"; "Chapter 4 Electroacoustics and Responses of Audio Systems"; "4.1 Electroacoustics"; "4.1.1 Loudspeakers"; "4.1.2 Microphones"; "4.2 Audio System Responses"; "4.2.1 Measurement of System Response"; "4.2.2 Ideal Reproduction of Sound"; "4.2.3 Impulse Response and Magnitude Response"; "4.2.4 Phase Response"; "4.2.5 Non-Linear Distortion"; "4.2.6 Signal-to-Noise Ratio"; "4.3 Response Equalization"; "Summary"; "Further Reading"; "References"; "Chapter 5 Human Voice"

Sommario/riassunto

In communication acoustics, the communication channel consists of a sound source, a channel (acoustic and/or electric) and finally the receiver: the human auditory system, a complex and intricate system that shapes the way sound is heard. Thus, when developing techniques in communication acoustics, such as in speech, audio and aided hearing, it is important to understand the time-frequency-space resolution of hearing. This book facilitates the reader's understanding and development of speech and audio techniques based on our knowledge of the auditory perceptual mechanisms by introducing the