534 MEY

Contents

Preface to the English Edition

Translator's Preface		xv
Figi	Figure Credits	
1.	Theory of Sound Fields	
1.1.	Sound in Liquids and Gases	1
1.2.	Sound in Porous Materials	13
1.3.	Sound in Solids	17
1.4.	Transmission Line Theory	29
1.5.	Sound Transmission through Walls	44
1.6.	Sound Diffraction and Scattering	51
1.7.	Reflection and Refraction of Sound Incident at an Oblique Angle	53
2.	Room Acoustics	
2.1.	Wave Theory of Room Acoustics	58
2.2.	Statistical Room Acoustics '	72
2.3.	Geometrical Room Acoustics	89

хi

vii

viii CONTENTS

3.	Attenuation of Sound	
3.1.	Absorption in Gases	95
3.2.	Sound Absorption in Liquids	103
3.3.	Sound Absorption by Walls	106
5.5.	Sound Rossiphon of Mana	700
4.	Nonlinear Effects	
4.1.	The Rayleigh Sound Radiation Pressure	117
4.2.	The Langevin Sound Radiation Pressure	119
4.3.	The Sound Radiometer	120
4.4.	The Ultrasonic Fountain	122
4.5.	Radiation Force from Waves on Strings	123
4.6.	Cavitation	124
4.7.	The Quartz Wind	127
4.8.	Shock Waves	128
5.	Radiation and Reception of Sound	
5.1.	Piston Radiator in a Tube	133
5.2.	Spherical Radiator	134
5.3.	Piston Radiator in an Infinitely Large Baffle	145
5.4.	Horn Radiator	147
5.5.	Directional Characteristics of Elementary Sound Sources	154
5.6.	Directionality of Arrays of Sources	160
5.7.	The Sound Field of Circular Pistons	170
5.8.	Comparison of the Beamwidths of Various Directional Sources	178
5.9.	Sound Radiation from Flexural Waves on Plates	179
	Directional Microphones	184
	Diffraction of Sound (in Connection with Sound Radiation and Reception)	193
5.12.	. The Schottky Law of Low-Frequency Reception ("Tiefenempfangsgesetz")	200
5.13.	The Absorbing Area of a Resonant Receiver	203
6.	Acoustical Measurement Techniques	
6.1.	The Rayleigh Disk	207
6.2.	The Wien Membrane Manometer	209
6.3.	Two Simple Methods for Measuring Small Vibration Amplitudes	210
6.4.	Calibration of a Condenser Microphone by Applying an Electrostatic Force	213
6.5.	Calibration in a Pressure Chamber	218
6.6.	Reciprocity Calibration	219
6.7.	Pressure and Free-Field Calibration	221
6.8.	Sound Field Analysis with Light	222
6.9.	Acoustical Measurement Chambers	228
6.10.	Measurement of Sound in Solids	229
7.	Physiological and Psychological Acoustics	
7.1.	The Ear.	234
72	Speech	257

CON	CONTENTS	
8.	Electroacoustic Transducers	
8.1.	Carbon Microphones	273
8.2.	Electrostatic Transducers	281
8.3.	Dynamic Transducers	289
8.4.	Electromagnetic Transducer	298
8.5.	Thermal Sound Sources and Receivers	300
8.6.	Piezoelectric Transducers	301
8.7.	Magnetostrictive Transducers	323
9.	Sound Recording	
9.1.	Disk (Stylus) Recording	330
9.2.	· · · ·	339
9.3.	Magnetic Recording	352
10.	Quantum Acoustics, Production and Detection of Extremely High-Frequency Sound	
10.1.	Electroacoustic Transducers for Hypersound	364
10.2.	. Thermal Phonon Radiators and Detectors	365
10.3.	Tunnel Contacts between Superconductors as Source and Detector	
	for Phonons	374
11.	Flow Acoustics	
11.1	. Generation of Sound by a Flow	384
	Interaction of Flow and Sound	394
Inde.	r	405
	••	.05