

Index

- absorption, 7, 70, 398, 408
- acoustic, acoustical
 - cross sections, 187
 - daylight, 107
 - density, 28, 36
 - diffraction, 7, 14
 - dipole, 87, 324
 - energy conservation, 58
 - high frequency, 518
 - impedance, 28
 - imaging, 559
 - intensity, 10, 30, 46
 - Mach number, 29
 - materials, 89
 - monopole, 86
 - particle velocity, 28, 45
 - passive, 413
 - power, 76
 - pressure, 7, 28, 45, 53
 - quadrupole, 87
 - radiation pressure, 130
 - remote sensing, 564, 581
 - scintillation, 507
 - source direction, 414, 415
 - streaming, 131
 - thermometry, 477
 - time reversal, 481
- aircraft noise, 582
- approximations
 - Arctic ice, 37
 - far field, 20
 - Fraunhofer, 19
 - Fresnel, 19
 - plane wave, 18
- arrays
 - directivity, 93
 - line, 90
 - steered, 109
 - towed, 568
- attenuation
 - formulas, 74
 - fresh water, 73
 - plane wave, 68
 - sea water, 73
- backscattering, 169
 - bubble, 304
 - surface, 296
- beam width, 102
- bioacoustic
 - absorption, 398
 - detection, 218
 - spectroscopy, 398
- Biot-Tolstoy theory, 247
- bottom
 - loss, 529
 - plumes, 556
- boundary layer, 315
- bubbles
 - acoustical cross section, 187
 - absorption, 194
 - attenuation, 194
 - backscattering, 201
 - breaking waves, 209, 540
 - coastal, 540
 - cross sections, 187, 191
 - damping, 186, 191, 209
 - densities, 206
 - directivity, 182
 - dispersion, 194
 - mass, 185
 - multiple, 194, 207
 - measurements, 180, 201
 - non-spherical, 192
 - production, 209
 - pulsation, 190
 - rainfall, 211
 - resonance frequency, 184
 - reverberation, 194

- scattering, 182
- sediment, 213
- Siphonophore, 230
- sizes, 336
- sound speed, 197
- sources, 206
- stiffness, 185
- void fraction, 208

- cavitation, 120
- coastal acoustics, 518
- condensation, 10, 15
- conservation
 - energy, 58
 - mass, 25
- coordinates
 - cylindrical, 41
 - Eulerian, 26
 - Lagrangian, 26
 - rectangular, 41
 - spherical, 42
- critical
 - angle, 33
 - range, 20
 - ratio, 432

- delta function
 - Dirac, 53
- diffraction, 14, 256, 261
- dipoles, 87, 177, 324
- directional, response, 95
- directivity, 97
 - factor, 102
 - index, 102
- dispersion, 7
 - waveguide, 230
- Doppler
 - current profiling, 502
 - navigation, 79
 - shift, 76, 500, 587
 - sonar, 338
 - velocimeter, 108

- equation of state, 27
- extinction cross section, 189, 406

- Faraday wave, 545
- far field, 20
- filter, 141
- fish
 - density, 407
 - instrumentation, 364
 - length, 404
 - models, 374, 382
 - monitoring, 398, 425
 - resonance, 399, 403
 - scatter, 376
 - structure, 229
 - targets, 377
 - tracking, 425
- flow
 - diffuse, 559
 - processes, 534
- Fourier slice theorem, 446
- frequency, 16
 - angular, 17
 - very high, 518
- Fresnel zones, 38

- harmonic distortion, 116
- head waves, 36
- Helmholtz–Kirchhoff–Fresnel
 - method, 249
- homogeneous medium, 7
- Hooke's Law, 27
- Huygens' Principle, 11
- hydrophone arrays, 320
- hydrothermal vents, 551

- imaging
 - mountain ranges, 564
- impulse, 10, 52
- intensity, 10, 46
- interference, 7, 21
 - at an interface, 22
- inverse problem, 470
- isotropic medium, 7

- listening systems, 108
- Lloyd's Mirror, 23
- longitudinal wave, 10

- masking, 425
- microneutron, 355
- modes, 240
- Molecular relaxation, 70
- monopole, 86

- near field, 20, 96
- Newton's Law, 26

642 Index

- noise
 - propeller, 584
 - ship, 159
- non-linearity, 526
- ocean bottom
 - attenuation, 529
 - PDF, 279
 - roughness, 280, 283
 - spatial correlation function, 283
 - spatial frequency spectra, 278
- ocean surface
 - frequency spectrum, 274
 - model, 289
 - moments, 269
 - PDF of displacements, 270
 - period, 16
 - roughness, 283
 - scatter, 281, 289, 293
 - space–time correlation, 278
 - spatial correlation, 275, 282
 - temporal correlation, 272
 - waves, 326
- parametric transducers, 122
- particle velocity, 28, 45, 53, 77
- pings, 144
- phase
 - spatial, 17
 - temporal, 17
- plane wave approximation, 18
- plankton, 355
- power radiated, 55
- pressure amplitude, 15
- pulse propagation, 53
- quadupole, 87
- rainfall, 341
 - drop sizes, 344
 - measurements, 346
 - sounds, 343
 - spectra, 349
- ray paths, 56, 61
- reflection 7, 12
 - along ray paths, 56
 - plane wave, 31
 - total internal, 33
- refraction, 7, 13, 31, 61, 589
- remote sensing, 581
- reverberation, 222
- resonance, fish, 399
- sampling
 - spatial, 138
 - temporal, 139
- scattering, 7, 164
 - backscatter, 300
 - barrier, 259
 - cross section, 166
 - escarpment, 249
 - fluid sphere, 180
 - layers, 225
 - ledge, 249
 - length, 165
 - plate, 256
 - Rayleigh, 173
 - ridge, 257
 - rigid sphere, 171
 - sea bed, 529, 582
 - sediments, 535
 - specular, 290
 - sphere, 171
 - wedge, 247, 253, 263
- seamount
 - diffraction 261
- shock wave
 - growth, 117
 - theory, 127
- scintillation, 500
- Snell's Law, 13
- sonar, 105
 - Doppler, 106
 - dual beam, 111
 - equation, 74
 - multibeam, 106
 - operation, 220
 - plume imagining, 554
 - side scan, 105, 530
 - split beam, 111
- sound, 7
 - biological, 155, 412
 - channels, 488
 - dolphin, 411
 - explosive, 126
 - Knudsen, 153
 - parametric, 122
 - piston, 95
 - pressure level, SPL, 74

- rainfall, 341
- random signal, 147
- ray paths, 56, 64
- sea surface, 153
- ship, 159, 435
- source level, SL, 75
- source location, 415
- spectral smoothing, 149
- spectroscopy, 398
- speed equation, 61
- speed profiles, 64
- speed estimates, 594
- travel times, 468
- source location, 414
- standing wave, 22
- surface scatter
 - computer model, 300
 - scale model, 297
- suspensions, 534
- target strength, 168
- time reversed transmission, 481, 488
- tomography, 467, 471, 477
- transducer
 - calibration, 103
 - descriptors, 100
 - elements, 86
 - materials, 89
 - wideband, 526
- transmission
 - air/sea, 306
 - loss, 75, 570
- turbulence, 338, 500
- velocity
 - current, 512
 - group, 239
 - phase, 238
- wave
 - breaking, 317
 - equation, 25, 41, 235
 - number, 17
 - omnidirectional, 44
- waveguide, 234
 - coastal, 243
 - scale model, 240
 - wedge, 243, 263
- whales
 - calls, 447, 452
 - census, 457
 - classification, 449
 - tracking, 422, 427
- zooplankton, 354, 355