

Index

Italic entries are key terms

acceleration, 37, 54, 94, 453
accelerograms, 54
accelerographs, 54
Adams-Williamson, 237
adiabatic conditions, 71
aftershocks, 22, 452
Airy's phase, 291
ak135 model, 229
aliasing, 515
analogical records, 45
anelasticity, 347
angle of incidence, 101
angle of polarization, 102
anisotropic media, 351
anisotropy, 335
 in the Earth, 335
anthropogenic, 477
apparent angle
 incidence, 141
 polarization, 141
apparent velocity, 147, 168
arrays, 55
aseismic slip, 482
asperities, 451, 452
asthenosphere, 26, 304, 350
attenuation
 body waves, 343
 coda waves, 348
 free oscillations, 346
 harmonic damped, 338
 surface waves, 345
average stress, 374
azimuth, 101
azimuthal anisotropy, 355

b parameter, 484
barriers, 451, 452
Benioff seismograph, 34
Benndorf relation, 168
Bessel equations, 107, 506
Bessel functions, 107, 319, 506
 spherical, 107
Betti's reciprocity theorem, 82
bilateral fractures, 434
body forces, 74, 88, 382, 415

body waves, 24, 88
Brune's model, 438
bulk modulus, 66
 adiabatic, 69
 isothermal, 69
Byerly's method, 458

Cauchy tensor, 61
cellular automata, 487
centroid, 360
centroid moment tensor, 427
characteristic earthquake, 496
circular fault, 375
 Brune's model, 438
 dynamic's model, 448
 Savage's model, 440
coda waves, 348
 attenuation, 357
cohesive zone, 449
Conrad discontinuity, 25
conservation of energy, 73
conservation of mass, 72
constructive interference, 259, 266,
 278, 282
continuity equation, 96
convolution, 35, 82, 385
core, 25
 composition, 256
 density, 256
 inner, 251
 outer, 251
 phases, 251
 transition zones, 256
 velocity models, 229, 251
core-mantle boundary, CMB, 25
corner frequency, 436, 440, 454, 470
Coulomb's stress transfer, 481
critical incidence, 120
crust, 24
 continental, 25, 27, 239
 mineral composition, 244
 oceanic, 27, 241, 244
 orogenic, 242
 structure, 242
 wave phases, 238

- cut-off frequency, 268
- cylindrical anisotropy, 356
- cylindrical coordinates, 110, 280, 502
- cylindrical waves*, 109
- damping, 33, 35, 335
 - critical, 339
 - factor, 36
- deep earthquakes, 20, 246, 460, 477, 488
- deep foci, 200
- delay time, 172, 179
- density distribution, 237
- deviatoric stress*, 65
- diffracted waves, 253
- digital seismographs, 45
- dilatancy, 495
- dipping layer, 176, 231
- directivity function*, 437
- dislocation, 388, 418, 456
 - shear, 400, 408, 432
- dispersed waves, 269, 289, 292, 345
- dispersion, 96, 271
 - curves, 268, 272
 - Earth structure, 300
 - equation, 266
 - Love, 279
 - Rayleigh, 277
- displacement-stress, 155
- double couple, 386, 422, 459
- dynamic models*, 382, 444
- dynamic range, 39
- Earth's structure, 14, 228
- earthquake early warning systems, 5, 30, 493
- earthquake engineering, 6, 54
- earthquakes
 - catalogue, 2, 359
 - doublets, 481
 - historical, 5, 360, 483
 - interplate, 376
 - intraplate, 376
 - precursor, 5, 494
 - spatial distribution, 20, 477
 - temporal distribution, 22, 480
- eikonal equation, 161
- elastic coefficients*, 65
- elastic energy, 70, 341, 389, 484
 - flux, 446
 - intensity, 123, 205, 224
 - partition, 123, 136
 - potential, 70, 71
- elastic rebound*, 380
- elastic rod, 313
 - longitudinal vibrations, 313
 - torsional vibrations, 315
- elastic string, 308, 310
- elastic waves, 23, 87, 115
- elasticity, 60
- empirical Green's functions, 464
- energy
 - seismic, 373, 374, 444
- energy magnitude relations, 373
- energy propagation, 96, 97, 224
- epicenter, 167, 358
 - instrumental determination, 361
 - macroseismic determination, 359
- epicentral distance, 35
- equation of motion, 73
 - seismograph, 36
- equivalent forces*, 382
- Euler's equation*, 77, 95
- excitation functions*, 389, 468
- explosive source, 418
- far field, 396, 424, 432
- fault, 6, 18
 - area, 360
 - normal, 381
 - orientation, 381
 - plane, 374
 - reverse, 381
 - strike. *See azimuth*
 - strike-slip, 381
 - types, 381
 - vertical, 381
- fault creep*, 20
- fault-plane solutions*, 458
 - graphical methods, 460
 - numerical methods, 461
- focal depth, 249, 358, 466
 - graphical methods, 362
 - intensity, 367
- focal sphere, 458
- foreshock*, 23, 452
- Fourier analysis of seismograms*, 297
- Fourier transform*, 511
- fractal, 486
- fracture, 2, 18, 380, 388
 - complexity, 449
 - dynamic model, 431
 - geometry, 381
 - kinematic model, 431
 - shear, 419
 - shear point source, 400
- free oscillations, 308
 - elastic sphere, 322
 - liquid sphere, 318
 - observations, 331
 - spheroidal modes, 323
 - toroidal modes, 323
- free surface motion
 - at the liquid, 126
 - at the solid, 139
- friction models, 448
- fundamental mode
 - free oscillations, 309

- fundamental mode (cont.)
 - guided waves, 266
 - Love waves, 274
 - Rayleigh waves, 278
- Galitzin seismograph, 33
- generalized inverse matrix, 153
- geometric spreading, 107
- GPS, 5, 56, 483
- Green’s function, 83, 384
 - far field, 397
 - infinite medium, 390
 - near field, 397
- Green–Volterra formula, 82
- Griffith’s energy, 446
- ground motion, 29, 35
- group velocity, 96
 - determination, 294
- Gutenberg and Richter
 - law, 484
 - magnitude, 369
- harmonic motion
 - damped, 37
- harmonics, 325
- Haskell’s model, 434
- head wave, 121, 171, 177
- healing front, 443
- Helmholtz
 - equation, 89
 - function, 71
 - theorem, 78
- Herglotz–Wiechert
 - plane medium, 203
 - spherical medium, 223
- Hooke’s law, 65
- Huygens’ principle, 127
- hypocenter, 12, 167, 358
 - determination, 360
- iasp91 model, 229
- IASPEI, 8
- impulsive
 - acceleration, 38
 - force, 79, 390
 - time function, 285
- incidence. *See* angle of incidence
 - normal, 120
- inhomogeneous waves, 121
- inner core, 25, 251
- instrumental response, 35, 49
- intensity, 17
 - attenuation, 367
 - instrumental, 367
 - maps, 359, 367
 - scales, 365
- inverse problem, 7, 202, 380
- isoseismal maps. *See* intensity maps
- isothermal bulk modulus, 69
- isotropic, 6, 66, 335
- isotropy transverse, 352
- Jeffreys–Bullen tables, 228
- kinematic models, 382
- Lagrangian formulation, 77, 187
- Lamé’s coefficients, 66
- Laplace transform, 511
- Legendre functions, 508
- lithosphere, 26, 245
- Love waves, 269, 271
 - dispersion equation, 272
 - displacements, 274
 - modes, 274
- low-velocity, 27, 179, 199, 221, 239, 246
- magnification, 33, 45
 - curve, 39
 - dynamic, 39
- magnitude, 17
 - distribution, 483
 - saturation, 372
 - scales, 368
- main shock, 22
- mantle, 24, 237
 - composition, 251
 - lower, 247
 - upper, 244
- Maxwell body, 336
- microseisms, 51
- migration
 - earthquakes, 23
 - technique, 233
- mode, 266
 - longitudinal, 315
 - spheroidal, 327
 - toroidal, 327
 - torsional, 316
- Moho
 - discontinuity, 24
 - phases, 238
- Mohorovičić’s law, 217
- moment tensor
 - inversion, 427
 - separation, 422
 - synchronous, 424
- multiplets, 331
- Navier’s equation, 76
- near field, 367, 397, 453
- network, seismologic, 34, 305

- Newton's second law, 36, 73
- noise, 51
- Nyquist frequency, 515
- Ocean Bottom Seismographs* (OBS), 56
- oceanic ridges, 21, 477
- Omori's law, 480
- origin time, 12, 358
- Orowan's condition, 378
- outer core, 25
- overtones, 309
- P wave, 24, 88
 - displacements, 99, 101
- paleoseismicity, 5, 483
- particle motion, 143, 278
- phase velocity, 91, 96, 285
 - apparent, 329
 - determination, 296
- plane waves, 98, 266
- plate boundaries, 27, 477
- plate tectonics, 19, 26, 245
- point source, 106, 204, 382, 414
 - dislocation, 400
 - displacements, 424
 - isotropic, 358
- Poisson
 - distribution, 22, 480
 - equation, 97
 - ratio, 67
 - solid, 68
- polarization angle, 102
- poles and zeros, 46
- potential. *See elastic energy*
- potential function, 71
 - of displacements, 78
 - of forces, 79
- prediction, 5, 30, 481
- Preliminary Earth Model (PREM), 229
- profile
 - dipping layer, 178
 - reflection, 230
 - refraction, 174, 230
- propagator matrix, 150
 - general problem, 157
 - P-SV motion, 158
 - SH motion, 154
- quality factor (Q), 341
 - observations, 356
 - P and S waves, 343
- radiation pattern, 396
 - Green functions, 398
 - shear fracture, 401
- radius of curvature, 184, 191, 213, 217
- radon gas, 495
- ramp function, 397
- ray beams, 204, 224
- ray parameter
 - plane, 116
 - plane medium, 184
 - spherical medium, 209
- ray path (trajectories), 98, 165
 - variable velocity, 184
- ray theory, 161
 - condition of validity, 164
 - variable velocity, 183
- ray tracing, 180
- Rayleigh waves
 - dispersion, 277
 - displacements, 263
 - half-space, 259
 - layer over half space, 276
- Rayleigh's equation, 262
- receiver functions, 235
- reduced times. *See tau functions*
- reflection
 - coefficients, 118
 - elastic media, 127
 - free surface, 132
 - two liquid media, 116
- refraction
 - coefficients, 118
 - elastic media, 127
 - two liquid media, 116
- representation theorem, 83
- resilience, 16
- rift zones, 27, 487
- rigidity modulus. *See shear modulus*
- rise time, 406
- rupture, 358, 427
 - arrest, 440
 - nucleation, 440
 - propagation, 440
 - velocity, 440
- S wave, 24, 88
 - displacements, 99, 101
- Savage's model, 440
- SEED format, 47
- seismic cycle, 481
- seismic gap, 494
- seismic hazard, 29, 490
 - deterministic assessment, 490
 - probabilistic assessment, 491
- seismic moment, 18, 374, 410
 - determination, 470
 - scalar, 372
 - tensor, 414
- seismic risk, 29, 490
- seismic tomography, 233
- seismic zonation, 491
- seismicity, 4, 20, 477

- seismogenic layer*, 18, 381, 486
- seismogenic zone*, 491
- seismograms*, 4, 32, 35
- seismographs*, 32
 - broad-band, 32, 35
 - digital. *See digital seismographs*
 - electromagnetic, 40
 - mechanical, 4
- seismology*, 1
 - division, 5
 - multidisciplinary science, 4
- seismometer*
 - theory, 35
- seismometer-galvanometer*, 33
- seismometry*, 6
- seismoscope*, 33
- seismotectonics*, 4, 26, 487
- self-organized criticality*, 495
- self-similarity*, 486
- shadow zone*, 199, 221, 244, 248
- shear modulus*, 66
- single couple*, 385
- site effects*, 54, 55, 359
- slip*, 374, 388, 418
 - angle, 381
 - distribution, 471
 - rate, 401
 - velocity, 389
 - weakening, 450
- slowness*, 147, 186
- Snell's law*, 115, 166, 209
- Somigliana's tensor*, 81
- source dimensions*, 432
- source mechanism*, 380
- source time function*, 406
- spectra*, 50
 - amplitude, 433
 - free oscillations, 331
 - scalar seismic moment, 372
- spherical waves*, 105
- splitting*, 331
- stack technique*, 232, 331
- standing waves*, 309
- static problem*, 444
- stationary phase*, 289
- stick-slip*, 485
- Stoneley waves*, 281
- strain tensor*, 62
- stress drop*, 374, 444
 - dynamic, 448
 - static, 448
- stress tensor*, 65
- strong motion*, 47
 - instruments, 54
- Sturm–Liouville equation*, 317
- subduction zones*, 27
- surface waves*, 24, 259
- swarm of earthquakes*, 23
- take-off angle*, 168, 224, 405
- tau function*, 169
- tectonosphere*, 246
- time residuals*
 - hypocenter, 363
 - tomography, 233
- time-predictable model*, 481
- total reflection*, 121
- transcurrent boundary*, 27
- transfer function*, 39
- transform faults*, 27
- travel time*, 167
 - deep focus, 200
 - dipping layer, 176
 - Earth structure, 228
 - plane medium constant velocity, 167
 - plane medium variable velocity, 185
 - sphere constant velocity, 212
 - sphere variable velocity, 214
- tsunami*, 14
- unilateral fractures*, 434
- upper mantle*, 25
- velocity*
 - apparent, 116
 - energy transport, 97
 - rupture, 431
- viscous body*, 336
- Wadati–Benioff zone*, 28
- wave equation*, 87
 - solutions, 89
- wave propagation in anisotropic media*, 352
- wave-form modeling*, 463
- websites*, 9
- work elastic*, 70
- Young's modulus*, 66
- Zöppritz's equations*, 131