

Index

a

Active phase locking
 – Techniques (general) 11, 46, 236–240, 284
 Amplified spontaneous emission 199, 243, 247–248, 268, 437
 Amplitude dynamics 377
 Antireflection coating 422
 Atmospheric turbulence 91, 167, 173–175
 Autocorrelation 285–286, 289, 294

b

B-integral 282, 289, 292
 Bandwidth (spectral) 11, 280–281
 Beam quality 3, 66, 127, 287, 295, 417, 441
 Beam steering 146–147, 355–356
 Bounce geometry 435
 Brightness 3
 Brillouin effect, *see* Stimulated Brillouin scattering

c

Calcite crystal 385
 Chirped-pulse amplifier 279, 285, 295–296, 299
 Coherent beam combining
 – Beam recombination, *see* Tiled aperture, Filled aperture, Diffractive optical elements
 – Efficiency, *see* Efficiency
 – Femtosecond regime, *see* Femtosecond
 – Passive beam combining, *see* Passive beam combining
 – Polarization beam combining, *see* Polarization beam combining
 – System requirements 5, 9, 148, 306
 – Techniques comparison 11, 46, 239–242, 340
 – Tolerances 9, 143–146, 148
 CO₂ lasers 75, 367
 Coupled cavity 314

d

Dammann grating 318–321, 340, 402, 410
 Diffractive optical element (DOE) 17–21, 31–37, 46, 125–127, 133–134, 138, 318, 410, 419
 Digital holography 158–161
 Directed energy 45
 Divided pulse amplification 295

e

Efficiency 20, 28, 33, 35, 89, 141–146, 158, 280–281, 354–355, 360–361, 408, 415, 440
 Electro-optic ceramic 155–156
 Electro-optic modulators 8, 155–156, 233
 End cap fiber 66
 Enhancement cavities 296–298
 Erbium doped fibers 156, 216, 223
 Eye safe operation 37

f

Fabry-Pérot 441
 Far-field pattern 131, 139–141
 Femtosecond 277–299
 Fiber arrays 148–151, 168–173
 Fiber Bragg grating 371
 Fiber lasers
 – General 26
 – Erbium doped fibers, *see* Erbium doped fibers
 – Large mode area (LMA) fibers, *see* Large mode area (LMA) fibers
 – Modes 45
 – Multicore, *see* Multicore fiber
 – Photonic crystal fibers, *see* Photonic crystal fibers
 – Thulium fibers, *see* Thulium fibers
 – Ytterbium doped fiber lasers, *see* Ytterbium doped fiber lasers
 Fill factor 141
 Filled aperture 16, 31, 46–47, 133–134, 138, 235–236, 314, 347

Finite difference time domain (FDTD) 322
 Four-wave mixing 433
 Frequency tunability 353
 FROG measurement 294

g

Gain holography 431
 Gaussian beam
 – Propagation 139
 Grating resonator 318–321

h

Hänsch-Couillaud detector 285
 Hänsch-Couillaud interferometer 237,
 241–242
 Heterodyne detection 11, 24–25, 27, 48,
 241–242
 Higher order modes 45
 High power operation 21, 25, 31, 64, 67, 75, 85,
 133, 345, 448
 Hill climbing 14, 48–56, 77, 103–134, 176–178,
 239–240
 Hexagonal pattern 142

i

Incoherent beam combining 46

j

Joint High Power Solid State Laser
 (JHPSSL) program 22

k

Kerr nonlinearity 27, 260–262

l

Laser
 – Brightness, *see* Brightness
 – Broad linewidths 30
 – Semiconductor, *see* Semiconductor lasers
 – Slab, *see* Slab laser
 Large mode area (LMA) fibers 45, 205, 270,
 287, 292
 LIDAR 231, 248
 LiNbO₃ 60, 62, 155, 287
 Littrow configuration 354
 LOCSET, *see* Multidithering
 Longitudinal modes 311–313, 348, 384–388

m

Mach-Zender interferometer 363–364
 Maréchal approximation 107
 Master oscillator 11, 27, 49, 234, 305
 Michelson resonators 314–318, 340, 373, 404

Microlens array 149
 Mid-infrared operation 401
 Mode-locked regime 365
 Monte-Carlo simulation 447
 Multicore fiber 347, 367
 Multidithering 13, 45, 48–70, 238–240, 286
 Mutual injection process 357

n

Neodymium: YAG 311, 317
 Neodymium: YVO₄ 436–439, 442
 Nonlinear effects
 – Stimulated Brillouin scattering, *see* Brillouin
 effect
 – Temporal decoherence 27–28
 Nonlinear phase shift 28

o

Optical parametric oscillators 401
 Optical time division multiplexing 367

p

Parallel coupled cavities 321–323
 Passive beam combining 46, 290, 305–308,
 345
 Phase conjugation 427–430, 456–461
 Phase error 55–59
 Phase modulators 8, 60, 155–156, 266
 Phase noise 38, 122, 130, 253–258
 Photonic crystal fibers 67–70, 293
 Pointing ability, *see* Beam steering
 Polarization beam combining 88
 Power stability 350
 Propagation 244, 278
 Pulsed regime 240–271, 362, 365, 449
 Pulse shape distortion 246–247
 Pulse synthesis 298–299
 PZT controlling 468, 471

q

Q-switching 362, 449
 Quadriwave lateral shearing interferometer
 (QLSI), *see* Shearing interferometer
 Quantum cascade laser 76, 401, 413
 Quantum noise 381
 Refractive index changes 193–226, 261–264
 Ridge waveguide 118–119

s

Sagnac interferometer 293
 Saturable absorber 366
 Self-Fourier cavity 336–340
 Self-pumped phase conjugation 434

Semiconductor lasers 76, 115
 Shearing interferometer 152–157, 237, 241–242
 Sine-Cosine single-frequency dithering 94–99
 Single frequency dithering 75–94
 Slab-coupled optical waveguide (SCOW) 104, 115, 117–128
 Slab laser 22–26
 Solid-state laser 22–26, 436–439, 450, 455
 Space-invariant optical architectures 321
 Space-time effects 283
 Space variant optical architectures 336
 Spatial filtering 325–329
 Spatial light modulator 159–161
 Speckle metrics based CBC 183–188
 Spectral beam combining 18, 46–47, 391
 Spectral phase mismatch 281, 287
 Spectral density 87, 256
 SPGD, *see* Hill climbing
 Stimulated Brillouin scattering (SBS) 27, 45, 248–252, 270, 455–461
 – SBS suppression 30, 67, 251
 – Materials 458
 Stimulated Raman scattering (SRS) 252, 270
 Strehl ratio 107–113
 Subwavelength grating 418
 Supermodes 308

t

Talbot resonator 329–336, 340
 Target-in-the-loop feedback 167
 Temporal multiplexing, *see* Divided pulse amplification
 Thermal effects 20, 23, 33
 Thulium fibers 37
 Tiled aperture 15, 46–47, 120, 129, 138–143, 235–236, 347
 Total internal reflection 22–23
 Tunability, *see* Frequency tunability

v

V-groove 32, 129, 149

w

Wavefront sensor, *see* Shearing interferometer
 Wavelength diversity (effect) 311

x

X-ray lithography 149

y

Ytterbium doped fiber lasers 26–27, 85, 104, 128, 195–198, 200–217, 223
 Ytterbium:YAG 455









