

Index

- aliasing 83 (*see also* spectral folding)
- amplitude 27
- amplitude transmittance 5 (*see also* transparency function)
- angular plane wave spectrum 8
- angular spectrum method (ASM) 95
 (*see also* convolution method, double Fourier transform method)
- bipolar point spread function 21
- charge-coupled device (CCD) 89–90
- chromatic aberration 40–2
- coherence length 46, 50
 transverse 53
- coherence time 46, 50
- coherent image processing 17
- coherent optical system 17
- coherent point spread function (CPSF) 16
- coherent transfer function (CTF) 16
- complementary metal-oxide- semiconductor (CMOS) 89–90
- complex amplitude 5, 27
- complex degree of coherence 43
- complex degree of mutual coherence 52
- complex degree of self coherence 52
- conjugate beam 73
- contour 169
- contouring
 two-wavelength 169–70
 two-illumination 172–4
- convolution integral 10
- convolution method 95 (*see also* angular spectrum method, double Fourier transform method)
- double Fourier transform method 95 (*see also* angular spectrum method, convolution method)
- equivalent wavelength 169 (*see also* synthetic wavelength)
- Ewald equation 136
- Ewald sphere 136
- fill factor 90
- first Born approximation 134
- first Rytov approximation 134
- four-*f* system 15
- Fourier plane 15
- Fourier transform
 discrete (DFT) 82, 95
 fast 83
 inverse 6
 inverse discrete (IDFT) 82, 95
 inverse temporal 47
 one-dimensional temporal 47
 spectroscopy 49
 three-dimensional 135
 two-dimensional 6
- Fraunhofer approximation 12
- Fraunhofer diffraction formula 12
- frequency resolution 81
- Fresnel diffraction formula 10, 203
- Fresnel diffraction method (FDM) 99
- Fresnel zone plate (FZP) 30, 91
 time-dependent (TDFZP) 140
- fringe visibility 44 (*see also* visibility)
- Gerchberg–Saxton algorithm 187 (*see also* iterative Fourier transform algorithm)
- graphic processing unit (GPU) 197
- Green’s function 134
- height sensitivity 169
- Helmholtz equation 5, 133
- hologram 28
 binary mask programmable (BMPH) 201
 carrier frequency 62 (*see also* hologram, off-axis)
 complex 120, 142
 detour-phase 179
 Fourier 68

- Fresnel 68
- Gabor 59
- image 64
- kinoform 185
- lensless Fourier 70
- off-axis 61 (*see also* hologram, carrier frequency)
- rainbow 73
- holography 27
 - compressive 161
 - computer-generated 179
 - diffraction tomographic 133
 - horizontal-parallax-only (HPO) 205
 - low-coherence digital 126
 - optical scanning (OSH) 137
 - parallel phase-shifting (PPSH) 124
 - phase-shifting (PSH) 118
 - quadrature phase shifting (QPSH) 120
- ideal thin lens 14
- incoherent image processing 20
- incoherent optical system 19
- incoherent spatial filtering 23
- intensity 27
- intensity point spread function (IPSF) 20
- interpolative wavefront recording plane method (IWRP) 193
- iterative Fourier transform algorithm (IFTA) 187 (*see also* Gerchberg–Saxton algorithm)
- Itoh algorithm 165
- L_1 norm 161
- L_2 norm 161
- Laplacian operator
 - in Cartesian coordinates 2
 - in spherical coordinates 3
- liquid crystal on silicon (LCOS) 195
- local fringe frequency 30, 99
- lock-in amplifier 140
- look-up table (LUT) 193
- magnification
 - holographic 38–9
 - of an image 152
- modulation transfer function (MTF) 22, 92
- Nyquist frequency 83
- object wave 27, 29
- optical sectioning 129 (*see also* sectioning)
- optical transfer function (OTF) 21
- orthoscopic image 32 (*see also* pseudoscopic image)
- out-of-focus haze 160
- paraxial approximation 9
- paraxial spherical wave 29
- phase 27
- phase tracking 164 (*see also* phase-unwrapping)
- phase unwrapping 164 (*see also* phase-tracking)
- photograph 27
- pixel pitch 90
- pixel size 83 (*see also* pixel pitch)
- plane wave 3
- power spectrum 47
- propagation vector 3
- pseudoscopic image 32 (*see also* orthoscopic image)
- PSF engineering 138 (*see also* pupil engineering)
- pupil function 15
- pupil engineering 138 (*see also* PSF engineering)
- quasi-monochromatic light 43, 45, 51
- reconstruction wave 30
- record length 81
- reference wave 29
- resolution 91
- root-mean-square error (RMSE) 189, 203
- sampling frequency 81
- sampling period 81
- sectioning 158 (*see also* optical sectioning)
- simple genetic algorithm (SGA) 204
- spatial carrier frequency 61
- spatial coherence 51–4
- spatial filtering 16
- spatial frequency transfer function in Fourier optics 9
- spatial frequency transfer function of propagation 8, 95
- spatial impulse response in Fourier optics 9, 203
- spatial impulse response of propagation of light 202
- spatial light modulator (SLM) 199
- spectral folding 83 (*see also* aliasing)
- spectrum 14
- spherical wave 4
- synchronous demodulation 141
- synthetic wavelength 169 (*see also* equivalent wavelength)
- temporal coherence 43–50
- three-dimensional scalar wave equation 2
- time-average integral 43
- translational distortion 39
- transparency function 5 (*see also* amplitude transmittance)
- twin image 32, 108
- under-sampling 83
- unit impulse sequence 81
- Van Cittert–Zernike theorem 54
- viewing angle 63
- virtual diffraction plane (VDP) 191
- visibility 44 (*see also* fringe visibility)
- wavefront recording plane (WRP) 191
- wave number 3
- Wiener–Khinchin theorem 47
- zero padding 87
- zeroth-order beam 31, 108