

Bibliography

**(Some other books about adaptive optics
that aren't nearly as funny as this one)**

Introduction to Adaptive Optics, R. K. Tyson, SPIE Press, Bellingham, WA (2000).

Principles of Adaptive Optics, R. K. Tyson, Academic Press, Boston, (1991, 2nd ed. 1997).

Field Guide to Adaptive Optics, R. K. Tyson and B. W. Frazier, SPIE Press, Bellingham, WA (2004).

Adaptive Optics for Astronomical Telescopes, J. W. Hardy, Oxford Univ. Press (1998).

Adaptive Optics, E. Kibblewhite and W. Wild, Wiley, New York (2007).

Adaptive Optics Engineering Handbook, R. K. Tyson, Ed., Marcel Dekker, New York (2000).

Atmospheric Adaptive Optics, V. P. Lukin, *Atmosfernaya Adaptivnaya Optika*, Novosibirsk: Nauka (1986); Translated into English, SPIE Press, Bellingham, WA (1995).

Imaging through Turbulence, M. C. Roggemann and B. Welsh, CRC Press (1996).

Field Guide to Atmospheric Optics, L. C. Andrews, SPIE Press, Bellingham, WA (2004).

Laser Beam Propagation through Random Media, L. C. Andrews and R. L. Phillips, SPIE Press, Bellingham, WA (1998, 2nd ed. 2005).

Introduction to Wavefront Sensors, J. M. Geary, SPIE Press, Bellingham, WA (1995).

Index

A

actuators, 66, 80, 100
adaptive optics, 5, 8, 9, 10
adaptive optics kit, 85
adaptive optics system, 29, 30, 31, 86, 87, 79, 80, 104
air, 16
amplitude, 31, 32
anisoplanatic, 50
 anisoplanatism, 91, 93
artificial wavefront beacon, 54, 57
astronomers, 6
atmosphere, 9, 20, 26, 56
averages, 22, 23

B

Babcock, Horace, 5
bimorph, 45, 69
bimorph mirror, 68
binoculars, 26, 27, 79
boost phase destruction, 51

C

camera, 18, 19
closed-loop, 80
coherence, 37
coherence length, 26, 27, 86
collimated, 90
computer models, 101
cone effect, 56, 57, 59
cones, 104
conjugate pupil, 87, 88, 91

continuous-faceplate deformable
 mirror, 66
converging, 90
curvature, 44, 68
curvature sensor, 44, 45

D

deformable mirror, 9, 31, 63, 64, 65, 71, 74, 86, 87, 90, 92
diverging, 90
diversity image, 81

E

eddies, 26
electrical charges, 70
electrostatic, 70
extreme adaptive optics, 94
Extremely Large Telescope, 94

F

fast system, 89
Feinleib, Julius, 54
field of view, 91
f-number, 89, 91
frequency, 32
Fried, David, 26

G

ground-layer adaptive optics, 93

H

Happer, Will, 57
Hartmann, Johannes, 40, 44

Hartmann spots, 43, 99
Hartmann test, 41
high-energy laser, 9, 53
hysteresis, 67, 68

I

index of refraction, 13, 14, 16, 19,
20, 22, 23, 61
inner scale, 24
interference, 35
isoplanatic, 50

K

Kolmogorov, 9, 20

L

laser, 103, 104
laser communications, 9
laser guide star, 54, 56, 57, 60, 61,
91, 92, 93, 97
laser resonators, 9
laser tomography adaptive optics,
93
lenslets, 41, 74
light wave, 32

M

magnetostrictive, 68
matrix multiplication, 74
MEMS, 69
MEMS deformable mirror, 70, 71
mesosphere, 57
micro-electro-mechanical systems,
69
multiconjugate adaptive optics, 92
multi-object adaptive optics, 94

N

Newton, Isaac 2, 104
nitrogen, 16

O

optics, 8
outer scale, 24
Overwhelmingly Large Telescope,
94
oxygen, 16

P

peek-and-poke method, 101
perpetual tremor, 2
phase, 31, 34, 35
phase conjugation, 31
photoreceptors, 103
piezoelectric, 66
pyramid sensor, 45
pyramid wavefront sensor, 46, 47

R

Rayleigh guide star, 55
Rayleigh scattering, 54
realization, 22
reconstructor, 9, 31, 73, 75, 86, 93
refraction, 15
registration, 88
resonant backscatter, 57
retina, 103, 104
Roddier, François, 44
rods, 104
rods and cones, 103
rubber mirror, 63

S

scattering, 54
segmented mirror, 65
Shack, Roland, 40, 41, 44
Shack-Hartmann sensor, 40, 42
Shack-Hartmann wavefront sensor,
9, 98
shearing interferometer, 40
single conjugate adaptive optics, 92
slow system, 89

sodium, 57, 58
sodium guide star, 59
sodium laser guide star, 58
sodium layer, 58
speed of light, 14, 52
statistics, 20, 23
subaperture, 41, 74, 86, 100

T

Tatarski, 20
thermal blooming, 53, 54
Thirty-Meter Telescope, 94
tilt, 60
tip/tilt mirror, 87
total internal reflection, 15
turbulence, 4, 5, 22, 23, 26,
64, 104
turbulence, atmospheric, 6, 38,
52, 63, 91, 105
turbulence, compensation for, 5
turbulent air, 2
turbulent eddies, 24, 25

V

vacuum, 13
variance, 22, 23
vitreous humour, 103

W

wavefront, 37, 38, 39, 63
wavefront beacon, 52, 55
wavefront curvature, 44
wavefront reconstructor, 73, 74
wavefront sensor, 31, 37, 40, 74,
86, 87, 88, 90, 91, 92, 93, 97, 98
wavelength, 26, 32



Robert K. Tyson is an Associate Professor of Physics and Optical Science at The University of North Carolina at Charlotte. He has a B.S. degree in physics from Penn State University and M.S. and Ph.D. degrees in physics from West Virginia University. Prior to his current academic position, he worked (or occupied an office) in the aerospace industry, first for United Technologies Corporation (West Palm Beach, FL) and then at Schafer Corporation (Chelmsford, MA). Bob Tyson, who enjoys teaching (especially undergraduates), lives in Charlotte, North Carolina with his wife, Peggy, and their cat, Speedway. His hobbies include travel, music, target shooting, and writing politically incorrect satire that is designed to annoy one or more groups of people or, at the least, inspire dynamic, philosophical yelling and screaming.