Index

A
absorptance, 18
absorptivity, 18
aerosol scattering, 116
Ambirajon and Look, 142
amplitude, 4, 21
analyzers, 55, 86
Anderson, 175
angle, Brewster, 71
angle of polarization, 44
angular frequency, 21
angular scattering coefficient, 66
Apel et al., 80
auxiliary angle, 45
Azzam, 146

B
Bailey, 87
Bartholinus, 2
beam transmission, 52
Berk, 108, 116
Bernard and Wehner, 157
Bicket, 87
bidirectional reflectance, 65
bidirectional reflectance distribution function (BRDF), 65, 67
bidirectional reflectance factor, 66
bidirectional reflectance variance function (BRVF), 76, 169
bidirectional scattering distribution function, 74
blackbody radiation equation, 17
Boucher, 83
Bowers, 138, 150
Bréon, 84, 95, 116
Brewster angle, 71, 171
Brown, 175

C
calcite, 2
Chandrasekhar, 110, 115
Chang et al., 61
Chenault, 88
Chipman, 141
Chun, 160
CIE, 7
circular polarization, 30, 32
circular polarization filter, 56
coherece, 4
Collett, 2, 21, 22, 137, 142
Commission Internationale de l’Eclairage, 7
Conant and Iannarilli, 94
cordinate space, 42
Coulson, 75, 110, 114, 115, 116, 122
Cremer, 198
Czapla-Myers, 84, 165

D
Dana, 76, 80, 165
Dana and Wang, 80
data reduction matrix, 142
Deering and Leone, 84, 165
degree of linear polarization, 42
degree of polarization (DoP), 42, 115
Demircan, 84
Deschamps, 3, 84
Devaraj, 112, 122
diattenuation, 150
diffuse, 64
diffuseness, 66
diffuse reflectance, 66
directional-hemispheric reflectance, 66, 75
DIRSIG, 121, 175, 227
division of amplitude polarimeters, 146
division of focal plane, 149
division of time polarimeter, 146
downwelled, 107, 112
Duncan, 94

effective responsivity, 15
effective spectral radiance, 15

241
<table>
<thead>
<tr>
<th>Term</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>effective value</td>
<td>14, 16</td>
</tr>
<tr>
<td>Egan</td>
<td>116, 144</td>
</tr>
<tr>
<td>Einstein</td>
<td>17</td>
</tr>
<tr>
<td>Elachi</td>
<td>1</td>
</tr>
<tr>
<td>electric field</td>
<td>21</td>
</tr>
<tr>
<td>elliptically polarized radiation</td>
<td>29</td>
</tr>
<tr>
<td>ellipticity angle</td>
<td>45</td>
</tr>
<tr>
<td>Ellis</td>
<td>95</td>
</tr>
<tr>
<td>emission polarization</td>
<td>191</td>
</tr>
<tr>
<td>emissivity</td>
<td>17</td>
</tr>
<tr>
<td>energy</td>
<td>8</td>
</tr>
<tr>
<td>Epema</td>
<td>82</td>
</tr>
<tr>
<td>exoatmospheric solar irradiance</td>
<td>108</td>
</tr>
<tr>
<td>extinction ratio</td>
<td>150</td>
</tr>
<tr>
<td>F</td>
<td></td>
</tr>
<tr>
<td>FASCODE</td>
<td>122</td>
</tr>
<tr>
<td>Feng et al.</td>
<td>78</td>
</tr>
<tr>
<td>Fessenkov's method</td>
<td>138</td>
</tr>
<tr>
<td>Fetrow</td>
<td>94, 117, 225, 227</td>
</tr>
<tr>
<td>field strength</td>
<td>21</td>
</tr>
<tr>
<td>Flynn and Alexander</td>
<td>67, 75</td>
</tr>
<tr>
<td>Forssell</td>
<td>196, 197, 198</td>
</tr>
<tr>
<td>frequency</td>
<td>4, 8</td>
</tr>
<tr>
<td>Fresnel</td>
<td>51</td>
</tr>
<tr>
<td>Fresnel reflectance</td>
<td>61, 68, 69</td>
</tr>
<tr>
<td>Fresnel reflectance coefficient</td>
<td>52</td>
</tr>
<tr>
<td>Fresnel surface reflection</td>
<td>51</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Gartley</td>
<td>199, 211, 227, 230</td>
</tr>
<tr>
<td>Gaskill</td>
<td>169</td>
</tr>
<tr>
<td>generators</td>
<td>86</td>
</tr>
<tr>
<td>generic radiometry solver</td>
<td>176, 181</td>
</tr>
<tr>
<td>geometric attenuation factor</td>
<td>89</td>
</tr>
<tr>
<td>Global Coordinate System</td>
<td>128</td>
</tr>
<tr>
<td>Goldstein</td>
<td>2, 21, 32, 45, 51, 68, 166</td>
</tr>
<tr>
<td>Goldstein and Jones</td>
<td>54</td>
</tr>
<tr>
<td>gray bodies</td>
<td>17</td>
</tr>
<tr>
<td>ground sample distance</td>
<td>77</td>
</tr>
<tr>
<td>Grum and Becherer</td>
<td>7, 19</td>
</tr>
<tr>
<td>Gurtan and Dahmani</td>
<td>192, 194</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
<tr>
<td>Han</td>
<td>165</td>
</tr>
<tr>
<td>Han and Perlin</td>
<td>80</td>
</tr>
<tr>
<td>Hapke</td>
<td>75</td>
</tr>
<tr>
<td>Hayes</td>
<td>88</td>
</tr>
<tr>
<td>He</td>
<td>94</td>
</tr>
<tr>
<td>Hecht</td>
<td>29, 51</td>
</tr>
<tr>
<td>hemispherical reflectivity</td>
<td>202</td>
</tr>
<tr>
<td>Henderson and Lewis</td>
<td>1</td>
</tr>
<tr>
<td>Herman</td>
<td>95</td>
</tr>
<tr>
<td>Hess and Priest</td>
<td>94</td>
</tr>
<tr>
<td>hot spot</td>
<td>65, 74</td>
</tr>
<tr>
<td>hue</td>
<td>154</td>
</tr>
<tr>
<td>Huygens' principle</td>
<td>23</td>
</tr>
<tr>
<td>I</td>
<td></td>
</tr>
<tr>
<td>index of refraction</td>
<td>51, 68</td>
</tr>
<tr>
<td>instrument Mueller matrix</td>
<td>141</td>
</tr>
<tr>
<td>intensity</td>
<td>25</td>
</tr>
<tr>
<td>Irma</td>
<td>227</td>
</tr>
<tr>
<td>irradiance</td>
<td>9</td>
</tr>
<tr>
<td>J</td>
<td></td>
</tr>
<tr>
<td>Jordan</td>
<td>192, 193</td>
</tr>
<tr>
<td>Jordan and Lewis</td>
<td>191, 192</td>
</tr>
<tr>
<td>K</td>
<td></td>
</tr>
<tr>
<td>Kirchoff's law</td>
<td>19, 199, 213</td>
</tr>
<tr>
<td>Kliger</td>
<td>2</td>
</tr>
<tr>
<td>Kokhanovsky</td>
<td>114, 115</td>
</tr>
<tr>
<td>L</td>
<td></td>
</tr>
<tr>
<td>Lambertian</td>
<td>64</td>
</tr>
<tr>
<td>Lambertian radiator</td>
<td>66</td>
</tr>
<tr>
<td>Lee</td>
<td>117</td>
</tr>
<tr>
<td>left-handed polarization</td>
<td>29</td>
</tr>
<tr>
<td>lens falloff</td>
<td>171</td>
</tr>
<tr>
<td>Leroy</td>
<td>84, 110</td>
</tr>
<tr>
<td>LIDAR</td>
<td>1</td>
</tr>
<tr>
<td>linear polarization</td>
<td>31</td>
</tr>
<tr>
<td>Lyapustin and Privette</td>
<td>82</td>
</tr>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Marschner</td>
<td>80</td>
</tr>
<tr>
<td>Mason</td>
<td>175</td>
</tr>
<tr>
<td>Maxwell</td>
<td>89, 199</td>
</tr>
<tr>
<td>Maxwell-Beard</td>
<td>89</td>
</tr>
<tr>
<td>Meyers</td>
<td>94, 227</td>
</tr>
<tr>
<td>Mie</td>
<td>113</td>
</tr>
<tr>
<td>Mie scattering</td>
<td>116</td>
</tr>
<tr>
<td>MODTRAN</td>
<td>108, 116, 117, 122</td>
</tr>
<tr>
<td>MODTRAN-P</td>
<td>180</td>
</tr>
<tr>
<td>Morel</td>
<td>160</td>
</tr>
<tr>
<td>Mueller</td>
<td>5, 57</td>
</tr>
<tr>
<td>Mueller matrix</td>
<td>57</td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Nadal</td>
<td>84, 95</td>
</tr>
<tr>
<td>Nandy</td>
<td>84</td>
</tr>
</tbody>
</table>
Index

NASA, 85
Nicodemus, 7, 12, 66, 73
Ni et al., 76
Nonconventional Exploitation Factors Data System (NEFDS), 93, 178
Nonconventional Exploitation Factors (NEF), 78, 93, 178
nonselective scattering, 116

O
optical depth, 113

P
Perlin, 165
Persons, 150
Pesses and Tan, 195, 196
Peterson, 88
phase, 22
phase function, 114
phase retarders, 55
photon, 8
Pickering’s method, 138
Planck, 17
Planck’s constant, 8
Poincaré, 47
Poincaré sphere, 47
Polar Heat, 195
polarimetric bidirectional reflectance distribution function (pBRDF), 5, 75, 85, 94, 168, 177, 200
polarimetric imaging, 1
polarization, 4
polarization angle, 34
polarization ellipse, 29
POLDER, 3, 84, 95
power, 8
P polarization, 71
Priest and Germer, 94, 179, 199
Priest and Meier, 94, 179
propagator, 27
Prosch, 138
pushbroom, 147
Pust and Shaw, 128

Q
quanta, 7
quarter wave plate, 55, 59

R
radiance, 12, 107
radiance transmission, 52
radiant exitance, 9
radiant flux, 8
radiometry, 7
radiometry solver, 176
Radke, 84
Ratliff, 150
Rayleigh, 114
Rayleigh scatter, 113, 114
Rayleigh scattering function, 115
reflectance, 18
reflectivity, 18, 51
registration, 149
Reid, 160
Rencz, 4
responsivity, 14
retarders, 55, 59
Richards, 2, 153
right-handed polarization, 29
Robinson, 227
Rondeaux, 95
rotation matrix, 42
Roujean, 178

S
Sabatke, 142
Sadjadi, 160
Sadjadi and Chun, 227
Sandford-Robertson, 94
Sandmeier, 79, 82, 83, 165
Sandmeier and Itten, 83, 165
saturation, 154
scattering, 113
scattering function, 65
Schaaf, 84
Schill, 83
Schott, 2, 7, 63, 107, 108, 115, 121, 147, 153, 175, 227
Schowengerdt, 2, 153
selective radiators, 17
Serrot, 83
shadowing and obscuration function, 202
Shaw, 161, 206
sheet-polarizer materials, 54
Shell, 63, 107, 174
Shell and Schott, 109, 112, 165, 227
Shurcliff, 2
signal to noise, 150
Smith, 122
Snell’s Law, 52, 69
Solomon, 138
spectral bandwidth, 16
spectral density, 14
Spectralon, 166, 171
spectral response, 14
spectroscopy, 4
specular, 64
specularity, 66
speed of light, 8
S polarization, 70
Stefan-Boltzmann, 19
steradian, 12
Stokes, 5, 32, 33, 38
Stokes parameters, 34
Stokes vector, 36, 45
Stokes vector images, 153
Stover, 74
Strahler, 79
superposition, 24
system matrix, 141

T
target, 42
Thilak, 153, 160
throughput, 13
Torrance and Sparrow, 88, 94, 179, 199
total spectral reflectance, 63
transmission, 18
transmissivity, 18
transmittance, 18
two-color polarimetric, 156
Tyo, 2, 139, 141, 146, 154, 155, 156, 157, 199, 206
Tyo and Wei, 143, 150

U
Umov, 73
Umov effect, 73, 171
upwelled, 107
upwelled radiance, 112
Ustin, 4

V
value, 154

W
Walraven, 139
Walthall, 82, 165
Wang, 165
wavelength, 4, 8
wave number, 8
Wien displacement law, 20
wire grid polarizer, 54, 211
Wolff, 137, 153

Y
Young, 22, 212

Z
“zero angle” bistatic scan, 89
Zhang, 161
Zhao, 161
Dr. John R. Schott is the Frederick and Anna B. Wiedman Professor of Imaging Science at the Rochester Institute of Technology. Dr. Schott founded and for decades oversaw the evolution of the remote sensing program at RIT into one of the premier programs in the United States for quantitative remote sensing. He has published hundreds of papers on remote sensing, supervised a wide range of research projects for both the civil and defense/intelligence communities, and served on various corporate and government scientific advisory boards. In recent years, Dr. Schott conducted a number of studies of polarimetric remote sensing phenomenology. These studies focused on the incorporation of polarimetric phenomenology into synthetic scene simulation models. To demonstrate and test the improved modeling capabilities, Dr. Schott has worked with his students to develop practical methods to measure the polarimetric bidirectional reflectance distribution function of the materials in the field. These measurement and modeling studies span a spectral range from the visible to the longwave infrared.