

Contents

Translators' foreword	VII
Special foreword	XI
Preface	XVII
Introduction	1
1 Imaging laws of geometrical optics	3
1 Construction of a ray refracted by a spherical surface .	3
2 Imaging of an arbitrary luminous axial point	6
3 Imaging of luminous objects	7
4 Imaging by a centered system of refracting spherical surfaces	9
5 Imaging equations according to Abbe	10
6 Imaging by wide-angle ray bundles (sine condition) . .	13
2 Imaging of self-luminous objects	21
7 Diffraction problems solved on the basis of Maxwell's theory	21
8 The Kirchhoff principle	23
9 Discussion of expression for the intensity at the observation point	30

10	Comparison of the Kirchhoff principle with the Fresnel–Huygens principle	33
11	Fraunhofer diffraction	35
12	Auxiliary consideration	37
13	Diffraction phenomena occurring in pairs of conjugate planes of optical systems	40
14	Determination of factors α , $\sigma(u)$, and $\psi(u')$ based on energy considerations	44
15	Expression of light disturbance at the observation point	51
16	Determination of light disturbance at the observation point using the Kirchhoff principle	52
17	Calculation of diffraction on an aperture of specific form for points in the plane conjugate to the object plane in the presence of a luminous surface element . .	57
3	Imaging of illuminated objects	65
18	Presence of several luminous points	65
19	Presence of several luminous surface elements	67
20	Single luminous slit	69
21	Two parallel and neighboring slits	73
22	An illuminated slit of finite width	84
23	Finite slit whose two halves possess a constant difference in phase	95
24	Slit of finite width with oblique incidence of light . . .	107
25	Switching of the order of integration in the calculation of the resulting light disturbance	120
26	Pointwise and similar imaging of the object	129
27	Dissimilar imaging of the object	131
4	Imaging of a grating with artificial clipping of diffraction orders	135
28	General intensity equation	135

29	Case I: Only the central image (the 0th order) goes through	137
30	Case II: Besides the central image, the left and right first maxima go through	142
31	Case III: Only the i th maxima on both sides contribute to imaging; the central image is blocked	145
Appendix		149
	Bibliography on the theory of imaging of illuminated objects	149
Translators' notes		151
A brief introduction to geometrical optics		173
On the $0.5\lambda/\text{NA}$ resolution limit in the imaging of periodic patterns		187
	Abbe's 15 December 1876 Letter to J. W. Stephenson	201