

BOOK REVIEW

MODERN GEOMETRICAL OPTICS—By Max Herzberger*. Pp 504+xii.
Interscience Publishers, New York, London, 1958. Price \$ 15.00

This book gives purely mathematical theories of image formation by optical systems. By representing the laws of reflection and refraction by an equation in which the vector product of two vectors in the object space is equated to a corresponding product in the image space, the problem of ray tracing has been reduced to that of solving equations involving vectors.

The book is divided into ten Parts, each part consisting of several Chapters. Part I of the book deals with the tracing of rays through optical systems and this can be done with the help of numerous formulae involving vectors and the necessary calculations can be made with the help of electronic computers. The terms 'diapoint' and 'diamagnification' have been introduced in this part and the properties of these points have been utilised in the succeeding parts. Part II deals with Gaussian Optics and its applications to different systems including thick lenses.

The general laws governing the passage of manifold of rays through optical systems have been discussed in Part III. As before, the vector equations have been given for these laws and the basic formulae of Hamilton and Lagrange have been discussed in this part. The formation of images by concentric systems has been discussed in Part IV and the vector formulae for the formation of images by rotation-symmetric systems including the discussions on image-error theory and limitations of optical image formation have been given in Part V.

The approximation theory of image formation in normal systems has been given in the different chapters of Part VI and the third and fifth-order image-error theories have been discussed in Part VII. In Chapter 31 of this Part formulae for the calculation of the characteristic functions for a combined system with the help of those for the parts of the systems have been derived.

Part VIII deals with interpolation theory of the optical image. The author himself has suggested an alternative method of solving the problem of image formation by complicated optical systems. In place of the actual ray tracing, help of some interpolation formulae is taken in this method. The analysis of spot diagrams is discussed in Chapter 33 in this Part.

Geometrical optics in inhomogeneous media is discussed in Part IX. Part X comprising four chapters, gives appendices dealing with 1) Vector analysis,

*The unusual delay in the publication of this review due to oversight is very much regretted. Editor.

2) Miscellaneous mathematical tools, 3) Numerical examples and 4) Historical remarks. A Bibliography is also given at the end.

The author himself has made remarkable contributions in this field and he has stated in the Preface that this book is the result of more than fourteen years' continuous labour. The tremendous amount of calculations required for the derivation of the numerous formulæ and for their verification will show the amount of labour involved in the preparation of this volume which is a great treasure to opticians engaged in the design of high-precision optical systems. The book is especially useful to those workers in the field who have facilities for using electronic computers. It is also useful to post-graduate students interested in applied optics. The get-up is excellent.

S. C. S.