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THE SYMMETRICAL OPTICAL SYSTEM

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PREFACE

In the following tract is given an outline of the theory of the Symmetrical Optical System, both from the purely geometrical and also from the physical point of view. The first few chapters are based upon a course of lectures delivered to students of mathematics and of physics and the interest, to this extent, is theoretical; but the methods employed lend themselves readily to the computation of actual optical systems, and in Chapter v are given formulae used in optical calculations: it is hoped that these will be of practical interest. The treatment is based upon the Characteristic Function of Hamilton or else upon one of its modifications, the Eikonal; for, in my opinion, such a function offers by far the most powerful method of examining the behaviour of optical systems, whether from the theoretical or from the practical point of view. The geometrical meaning of the various aberrations is considered, both those of the first order and also those of higher orders, together with the more important of the Optical Conditions such, for example, as the recent Optical Cosine Law, of which the well-known Sine-Condition is but a particular case. And, inasmuch as the effect of the geometrical aberrations is very largely masked by diffraction phenomena, an account is given of the diffraction patterns associated with the optical system and the modifications of them due to these geometrical aberrations; moreover in addition to the usual circular aperture other forms of aperture also are considered, namely, the annular aperture, the slit aperture and the semi-circular aperture.

I am greatly indebted to Mr T. Smith, of the Optical Department of the National Physical Laboratory, for his kindness in reading the proofs of the tract; and I should like to record here my gratitude to him for his kindly encouragement in optical work and for many pleasant hours spent at the Laboratory.

I have also to render my acknowledgments to the Council of the Royal Society for their courteous permission to reproduce several diffraction diagrams, appearing in the last two chapters, which were published in a Paper communicated to the Society. And, finally, it remains for me to express my thanks to the University Press for the usual and very high standard of their work.

G. C. S.

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