

<<现代经典光学>>

图书基本信息

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## 前言

The level of treatment in this book is that of the fourth year of an M. Phys. undergraduate course in the UK. However, I have tried to give descriptions that are simple enough to be followed by someone at an earlier stage who seeks a different account of the more basic material. And graduates may find that some well-understood ideas offer unexpected challenges. The topics included here are more than could be covered in the time available in any one undergraduate course, but different courses will, quite properly, make different selections of material. I concentrate on physical optics (light as a wave), and describe only as much geometrical optics as is really necessary. A thick lens is mentioned only three times. Lens design and optical aberrations are hardly mentioned at all, and then in terms of an optical transfer function rather than Seidel sums. I justify this exclusion on the ground that lens design is now wholly done by computer-aided optimization, description of which would require a very different style of presentation. This book might better have been called semi-classical optics, since the photon nature of light is not ignored. Indeed, photon emission and detection are inherently quantum-mechanical. However, our main concern, the passage of light between emission and detection, can usually be treated classically. Those phenomena, such as entanglement or anti-bunching, that require quantum optics proper lie outside our remit. Even so, I have tried, in Chapter 10, to explain where the interface lies between the (semi-) classical and quantum regimes. In a book of this length, some selection of topics is unavoidable, even within physical optics. In particular I regret the omission of interference microscopes (too large a digression) and of adaptive optics applied to Earth-bound astronomical telescopes (too computational). A book is a linear structure: from beginning to end. Understanding is not like that. It is achieved by reading interactively: checking calculations; cross-linking new information with implications and possible objections; asking what if; thinking why is always assumed to be 1 at optical frequencies?

Why is an electromagnetic wave always discussed in terms of its E-field when B is equally significant in the Maxwell equations?

A Fabry-Perot and a thin film are very similar structures; why then are the methods of analysis so different?

Can we trust the Kirchhoff-assumption boundary conditions used in diffraction, and how could we find out?

Why are the fields inside a laser cavity mathematically similar to the wave functions for a simple harmonic oscillator?

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### 内容概要

从现代的视角描述了经典光学，也可称为“半经典光学”。书中内容大都与经典光学相关，包含了相关的现象、仪器和技术，以及一些常见的主题：衍射、干涉、薄膜和全息光学，也涉及了高斯光束、激光腔、CD阅读器和共焦显微镜。涉及少量的量子光学。

《现代经典光学》内容丰富、新颖，讲解透彻，各章最后均附有相关习题，书末附有部分习题的解答，可供高年级本科生及低年级研究生参阅，也可作为相关领域研究人员的参考书。

《现代经典光学》作者为牛津大学物理系的Geoffrey Brooker。

## 书籍目录

1 Electromagnetism and basic optics 1.1 Introduction 1.2 The Maxwell equations 1.3 Linear isotropic media 1.4 Plane electromagnetic waves 1.5 Energy flow 1.6 Scalar wave amplitudes 1.7 Dispersive media 1.8 Electrical transmission lines 1.9 Elementary ( ray ) optics 1.9.1 The thin lens 1.9.2 Sign conventions 1.9.3 Refraction at a spherical surface 1.9.4 The thick lens 1.10 Rays and waves Problems 2 Fourier series and Fourier transforms 2.1 Introduction 2.2 Fourier series : spectrum of a periodic waveform 2.3 Fourier series : a mathematical reshape 2.4 The Fourier transform : spectrum of a non-periodic waveform 2.5 The analytic signal 2.6 The Dirac function 2.7 Frequency and angular frequency 2.8 The power spectrum 2.9 Examples of Fourier transforms 2.9.1 A single rectangular pulse 2.9.2 The double pulse 2.9.3 A 2.9.4 A regular array of 2.9.5 A random array of 2.9.6 An infinite sinewave 2.10 Convolution and the convolution theorem 2.11 Examples of convolution 2.12 Sign choices with Fourier transforms problems 3 Diffraction 3.1 Introduction 3.2 Monochromatic spherical wave 3.3 The Kirchhoff diffraction integral 3.4 The Kirchhoff boundary conditions 3.5 Simplifying the Kirchhoff integral 3.6 Complementary screens : the Babinet principle 3.7 The Fraunhofer condition I : provisional 3.8 Fraunhofer diffraction in one dimension 3.9 Fraunhofer diffraction in two dimensions 3.10 Two ways of looking at diffraction 3.11 Examples of Fraunhofer diffraction 3.12 Fraunhofer diffraction and Fourier transforms 3.13 The Fraunhofer condition : Rayleigh distance and Fresnel number 3.14 The Fraunhofer condition : object and image 3.15 The Fresnel case of diffraction 3.16 Fraunhofer diffraction and optical resolution 3.17 Surfaces whose fields are related by a Fourier transform 3.18 Kirchhoff boundary conditions : a harder look Problems 4 Diffraction gratings 4.1 Introduction 4.2 A basic transmission grating 4.3 The multiple-element pattern 4.4 Reflection grating 4.5 Blazing 4.6 Grating spectrometric instruments 4.7 Spectroscopic resolution 4.8 Making gratings 4.9 Tricks of the trade 4.9.1 Normal spectrum 4.9.2 Correct illumination 4.9.3 Shortening exposure times with a spectrograph 4.9.4 Vacuum instruments 4.9.5 Double monochromator 4.9.6 An inventor's paradise 4.10 Beyond the simple theory Problems 5 The Fabry-Perot 5.1 Introduction 5.2 Elementary theory 5.3 Basic apparatus 5.4 The meaning of finesse 5.5 Free spectral range and resolution 5.5.1 Free spectral range 5.5.2 Resolution 5.6 Analysis of an étalon fringe pattern 5.7 Flatness and parallelism of Fabry-Perot plates 5.8 Designing a Fabry-Perot to do a job 5.9 Practicalities of spectroscopy using a Fabry-Perot 5.10 The Fabry-Perot as a source of ideas Problems 6 Thin films 6.1 Introduction 6.2 Basic calculation for one layer 6.3 Matrix elimination of middle amplitudes 6.4 Reflected and transmitted Waves 6.5 Impedance concepts 6.6 High-reflectivity mirrors 6.7 Anti-reflection coatings 6.8 Interference filters 6.9 Practicalities of thin-film deposition Problems 7 Ray matrices and Gaussian beams 7.1 Introduction 7.2 Matrix methods in ray optics 7.3 Matrices for translation and refraction 7.4 Reflections 7.5 Spherical waves 7.6 Gaussian beams 7.7 Properties of a Gaussian beam 7.8 Sign conventions 7.9 Propagation of a Gaussian beam 7.10 Electric and magnetic fields Problems 8 Optical cavities 8.1 Introduction 8.2 Gauss-Hermite beams 8.3 Cavity resonator 8.4 Cavity modes 8.5 The condition for a low-loss mode 8.6 Finding the mode shape for a cavity 8.7 Longitudinal modes 8.8 High-loss cavities 8.9 The symmetrical confocal cavity 8.10 The confocal Fabry-Perot 8.11 Choice of cavity geometry for a laser 8.12 Selection of a desired transverse mode 8.13 Mode matching Problems 9 Coherence : qualitative 9.1 Introduction 9.2 Terminology 9.3 Young fringes : tolerance to frequency range 9.4 Young fringes : tolerance to collimation 9.5 Coherence area 9.6 The Michelson stellar interferometer 9.7 Aperture synthesis 9.8 Longitudinal and transverse coherence 9.9 Interference of two parallel plane waves 9.10 Fast and slow detectors 9.11 Coherence time and coherence length 9.12 A Michelson interferometer investigating longitudinal coherence 9.13 Fringe visibility 9.14 Orders of magnitude 9.15 Discussion 9.15.1 What of lasers ? 9.15.2 The Young slits : another look 9.15.3 Fast and slow detectors : another look 9.15.4 Grating monochromator : another look 9.15.5 Polarized and unpolarized light Problems 10 Coherence : correlation functions 10.1 Introduction 10.2 Correlation function : definition 10.3 Autocorrelation and the Michelson interferometer 10.4 Normalized autocorrelation function 10.5 Fringe visibility 10.6 The Wiener-Khinchine theorem 10.7 Fourier transform spectroscopy 10.8 Partial coherence : transverse 10.9 The van Cittert-Zernike theorem 10.10 Intensity correlation 10.11 Chaotic light and laser light 10.12 The Hanbury Brown-Twiss experiment 10.13 Stellar diameters

measured by intensity correlation10.14 Classical and quantum opticsProblems11 Optical practicalities : étendue , interferometry , fringe localization11.1 Introduction11.2 Energy flow : étendue and radiance11.3 Conservation of étendue and radiance11.4 Longitudinal and transverse modes11.5 étendue and coherence area11.6 Field modes and entropy11.7 Radiance of some optical sources11.7.1 Radiance of a black body11.7.2 Radiance of a gas-discharge lamp11.7.3 Radiance of a light-emitting diode ( LED ) 11.8 étendue and interferometers11.9 Étendue and spectrometers11.10 A design study : a Fourier-transform spectrometer11.11 Fringe localizationProblems12 Image formation : diffraction theory12.1 Introduction12.2 Image formation with transversely Coherent illumination informal12.3 Image formation : ideal optical system12.4 Image formation : imperfect optical system12.5 Microscope resolution : Abbe theory12.5.1 Abbe theory : introduction12.5.2 Abbe theory : explanation12.6 Improving the basic microscope12.7 Phase contrast12.8 Dark-ground illumination12.9 Schlieren12.10 Apodizing12.11 Holography12.12 The point spread function12.13 Optical transfer function;modulation transfer functionProblems13 Holography13.1 Introduction13.2 Special case : plane-wave object beam and plane-wave reference beam13.3 The intensity of the reference beam13.4 The response of a photographic emulsion13.5 The theory of holography13.6 Formation of an image13.7 What if we break a hologram in half ? 13.8 Replay with changed optical geometry13.9 The effect of a thick photographic emulsion13.10 Phase holograms13.11 Gabor's holograms13.12 Practicalities13.13 Applications of holographyProblems14 Optical fibres14.1 Introduction14.2 Fibre optics : basics14.3 Transverse modes14.4 Dispersion14.4.1 Material dispersion14.4.2 Intermodal and intramodal dispersion14.5 Multimode fibres14.6 Single-mode fibresProblems15 Polarization15.1 Introduction15.2 Anisotropic media15.3 The mathematics of anisotropy15.4 The understanding of tensor 錚j15.5 The Faraday effect15.6 Optical activityProblems16 Two modern optical devices16.1 Introduction16.2 Compact disc : description of the disc16.3 Compact disc : the encoding scheme16.4 Optics of reading a compact disc16.5 Feedback systems16.5.1 Correction of tracking16.5.2 Correction of focus16.6 CD-ROM16.7 DVD16.8 The confocal microscope16.9 Confocal microscope : resolution16.10 The confocal microscope : depth of focusProblemsNotes on selected problemsBibliographyIndex

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