《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 ear-lier stage who seeks a different account of the more basic material. And graduates may find that some well-understood ideas offer un expected challenges. The topics included here are more than could be covered inthe time available in any one undergraduate course, but different courseswill, quite properly, make different selections of material.I concentrate on physical optics (light as a wave), and describe onlyas much geometrical optics as is really necessary. A thick lens is men-tioned only three times. Lens design and optical aberrations are hardlymentioned at all, and then in terms of an optical transfer function rathert han Seidel sums. I justify this exclusion on the ground that lens de-sign is now wholly done by computer-aided optimization, description ofwhich would require a very different style of presentation. This book might better have been called semi-classical optics, sincethe photon nature of light is not ignored. Indeed, photon emission anddetection are inherently quantum-mechanical. However, our main con-cern, 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, evenwithin physical optics. In particular I regret the omission of interferencemicroscopes (too large a digression) and of adaptive optics applied toEarth-bound astronomical telescopes (too computational). A book is a linear structure: from beginning to end. Under standingis not like that. Its achieved by reading interactively: checking calcula-tions; cross-linking new information withof implications and possible objectionsold; asking what if; thinkingWhy is always assumed tobe 1 at optical frequencies? Why is an electromagnetic wave always dis-cussed in terms of its E-field when B is equally significant in the Maxwelle quations? A Fabry-Perot and a thin film are very similar structures;why then are the methods of analysis so different? Can we trust theKirchhoff-assumption boundary conditions used in diffraction, and howcould we find out? Why are the fields inside a laser cavity mathemati-cally similar to the wave functions for a simple harmonic oscillator?

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内容概要

《现代经典光学》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。

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