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BOOK REVIEW

Wave Optics and its Applications
by Rajpal S. Sirohi
Orient Longman : Hyderabad, India (1993)
xv+404 pages, illustrated , price . Rs 170 00 (soft cover) , ISBN 0-86311-271-4

In the last three decades, the subject matter of optics has almost changed beyond recognition. These changes, mainly due to the advent of lasers, have made optics one of the frontline areas of physical research. Some aspects of this change are also being reflected in postgraduate curricula in the introduction of new topics. To meet the growing demand from students, many new textbooks on optics have appeared in the Indian market. Some of these new books are very good indeed.

The present book is another of this genre. It has been written with the need of the students in mind. Both the undergraduate and post-graduate students will find the book useful. The first half of the book, consisting of the first five chapters, mainly deals with conventional topics, which are part of the B. Sc. hons. Physics curriculum. The treatment is generally lucid but compact.

The first two chapters are on the propagation and dispersion of electromagnetic waves in isotropic media, and the reflection and refraction of such waves from boundaries between dielectric media, as well as from metallic surfaces. The third chapter deals with vector properties of electromagnetic waves, leading to their polarization. This vector nature of electromagnetic waves becomes manifested when propagation occurs through anisotropic media. The phenomenon of double refraction has been well explained and action of several types of polarizers, beam splitters and compensators discussed briefly. The author also introduces the elegant mathematical formalisms for unified treatment of any kind of polarized, unpolarized or partially polarized light and their interaction with optical components. This chapter should be of special interest to advanced students. The fourth and fifth chapters cover standard materials respectively on interference and diffraction of electromagnetic waves, which are taught in undergraduate courses.

In the second half of the book, from chapters six to nine, the author moves to more advanced topics, which have not yet been incorporated in the undergraduate syllabus. However, some of these concepts are now taught in M. Sc. Courses in Physics or Electronics in many Indian universities. These concepts are broadly concerned with the image formation and data processing by optical beams and are of relevance to the new field of optical engineering. The exposition of the topics is clear and the level of presentation elementary, so that these chapters

will be understandable and useful to a wider level of audience. Also, each chapter is followed by a number of exercises, which, if worked out, can extend the understanding by a great deal. My impression is that most of them should not be excessively difficult for the level of students for which these chapters were intended.

Chapter six introduces an elementary mathematical framework for treating the coherence properties of light. Concepts of spatial and temporal coherence are introduced, and the calculation of the degree of complex coherence of an extended source is demonstrated. The principle of stellar interferometer has also been discussed. The next chapter provides an introduction to Fourier optics, which is the basis for filtering and optical data processing. This chapter, and the next one on holography, will also be useful for students and scientists as an introduction to the basics of optical engineering. The penultimate chapter on holography starts with simple ideas introduced earlier and, with the use of elementary mathematics introduces the ideas of holography in steps. This is the biggest chapter in the whole book and different types of holograms and their applications have been covered in sufficient detail.

The last chapter is concerned with measurements. It is primarily about the use of interferometers in the fundamental measurement of length and for assessing the performance and perfection of various optical components. These materials are not normally covered in conventional optics textbooks.

Thus, in conclusion, it may be said that this is a very readable compact text on fundamentals of physical optics and optical engineering which, both undergraduate and postgraduate students may consult with profit.

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The Wave Optics Module solves problems in the field of electromagnetic waves at optical frequencies (corresponding to wavelengths in the nano- to micrometer range). The underlying equations for electromagnetics are automatically available in all of the physics interfaces â€” a feature unique to COMSOL Multiphysics. This also makes nonstandard modeling easily accessible.Â Click to view a summary of the model or application and its properties, including options to open it or its associated PDF document. The Application Libraries Window in the COMSOL Multiphysics Reference Manual. Opening the Application Libraries Window To open the Application Libraries window ( ) Optics is the branch of physics that studies the behaviour and properties of light, including its interactions with matter and the construction of instruments that use or detect it. Optics usually describes the behaviour of visible, ultraviolet, and infrared light. Because light is an electromagnetic wave, other forms of electromagnetic radiation such as X-rays, microwaves, and radio waves exhibit similar properties. The guided-wave-acoustooptics involving Bragg interactions between guided optical waves and surface acoustic waves is one of the areas of in tegrated-optics that has reached some degree of scientific and technological maturity. This topical volume is devoted to an in-depth treatment of this emerging branch of science and technology.Â The field of integrated- or guided-wave optics has experienced significant and continuous growth since its inception in the late 1960s. There has been a considerable increase in research and development activity in this field worldwide and some significant advances in the realization of working in tegrated optic devices and modules have been made in recent years. Learn about Wave Optics topic of physics in details explained by subject experts on vedantu.com. Register free for online tutoring session to clear your doubts.Â Based on Medium Necessity: A wave may or may not require a medium for its propagation. The waves which do not require a medium for propagation are known as non-mechanical waves. Example: light, heat, radio, waves, etc. on the other hand waves which require medium for propagation are called mechanical waves. Example: elasticity and density. For this reason elastic waves are known as mechanical waves. Based on Energy Propagation: Waves can be divided into two parts on the basis of energy propagation.