

VIEWS OF OPTICS RESEARCH AROUND THE WORLD

International Trends in Optics

Edited by
Joseph W. Goodman
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Reviewed by W. J. Tomlinson

In his preface to *International Trends in Optics*, Joseph W. Goodman of Stanford University explains that two of his goals for this book were "to provide a broad view of the work underway in the field of optics throughout the world" and "to provide a different style of technical article than is found in journals and formal reviews, one that is more informal and has some speculative aspect." (More on his other purposes later.) Goodman has been sufficiently successful at achieving these goals that the book presents a substantial challenge for a reviewer. Each of the 34 chapters is a relatively concise summary (15 pages long on average) of a subfield or an aspect of optics, written by a leader or leaders in that area.

This is an important book, and most people with some involvement or interest in optics will find it both interesting and rewarding. But for each reader the interests and the rewards will be different. I expect that many readers will approach the book as I did, in three successive stages, reading first about his or her current interests, then exploring topics of related or historical interest and finally seeking out subjects of general cultural enrichment or entertainment. In a review it is impossible to describe all the chapters, so to provide a somewhat more focused

picture of the contents of the book, I give an example of one or two chapters that I found notable in each of these three categories. (My apologies in advance to the authors of the chapters that I do not have space to mention.)

When reading about one's current areas of interest, a researcher is looking not for facts, but for insights and for the speculations, unsolved problems and predictions that the editor lists in his goals. I found the chapter on integrated optics (my own field) by Herwig Kogelnik to be a concise summary of the current state of the field, its challenges and dreams. Kogelnik summarizes the latter two points in a single subtle sentence: "The absence of practical field applications . . . has been a severe test of the patience of the R&D community." He goes on to elaborate on these issues and offers some hope for the future, which I sincerely hope is well founded. Such chapters also provide perceptive descriptions of the importance of and rationale for research in one's field, which can be quoted or adapted in contract proposals or briefings for upper management.

From chapters covering related or historical interests, a reader is interested in obtaining both an overview of the state of the field and some insight into and speculations about the future. For example optical computing is a hoped-for future of much integrated optics research: The chapter titled "Computing: A Joint Venture for Light and Electricity?" by Pierre Chavel appears to have more insight and honest assessments to offer than I could grasp in a few readings, and I have marked it for further careful study. One of my historical interests is optical-disk memories, and I found that the chapter by Yoshito Tsunoda provided a readable summary of current technology (including detailed performance data for current systems, which helped me appreciate recent advances), as well as some

sense of current research directions.

Perhaps the most valuable chapters in the book are those that might be categorized as general cultural enrichment or entertainment. It is here that one is most likely to encounter the unexpected insights and the information that can lead one to major changes in research and career directions. The book provides a wealth of well-written, concise chapters on a wide variety of such topics. The following chapters are among those that caught my attention: "The Opposition Effect in Volume and Surface Scattering," by J. C. Dainty describes the subtle complexity of an everyday phenomenon, as well as progress towards our understanding of this complexity. The title of the chapter by Pál Greguss "Unusual Optics: Optical Interconnects as Learned from the Eyes of Nocturnal Insects, Crayfish, Shellfish, and Similar Creatures," says it all. "Blind Deconvolution—Recovering the Seemingly Irrecoverable!" by R. H. T. Bates and Hong Jiang is a dazzling example of how authors can make a complex topic understandable and still create a delightful intellectual "page turner." (Sadly this delight is counterbalanced by the news of Bates's death before the book was published.)

For each reader, many of the chapters falling into this category are likely to be either too detailed or too superficial, but because the chapters are short it is easy to skip over excessive detail. And because each chapter includes a substantial number of references, it should be relatively easy to locate further details on a topic of interest.

Goodman, as editor of this volume, has two other goals in addition to those mentioned above: To support and to publicize the International Commission on Optics, to which he and all of the authors have assigned their royalties from this book. This most worthy purpose is described in more detail in the editor's preface.

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