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Introduction to the Series

Since its inception in 1989, the Tutorial Texts (TT) series has grown to cover many diverse fields of science and engineering. The initial idea for the series was to make material presented in SPIE short courses available to those who could not attend and to provide a reference text for those who could. Thus, many of the texts in this series are generated by augmenting course notes with descriptive text that further illuminates the subject. In this way, the TT becomes an excellent stand-alone reference that finds a much wider audience than only short course attendees.

Tutorial Texts have grown in popularity and in the scope of material covered since 1989. They no longer necessarily stem from short courses; rather, they are often generated independently by experts in the field. They are popular because they provide a ready reference to those wishing to learn about emerging technologies or the latest information within their field. The topics within the series have grown from the initial areas of geometrical optics, optical detectors, and image processing to include the emerging fields of nanotechnology, biomedical optics, fiber optics, and laser technologies. Authors contributing to the TT series are instructed to provide introductory material so that those new to the field may use the book as a starting point to get a basic grasp of the material. It is hoped that some readers may develop sufficient interest to take a short course by the author or pursue further research in more advanced books to delve deeper into the subject.

The books in this series are distinguished from other technical monographs and textbooks in the way in which the material is presented. In keeping with the tutorial nature of the series, there is an emphasis on the use of graphical and illustrative material to better elucidate basic and advanced concepts. There is also heavy use of tabular reference data and numerous examples to further explain the concepts presented. The publishing time for the books is kept to a minimum so that the books will be as timely and up-to-date as possible. Furthermore, these introductory books are competitively priced compared to more traditional books on the same subject.

When a proposal for a text is received, each proposal is evaluated to determine the relevance of the proposed topic. This initial reviewing process has been very helpful to authors in identifying, early in the writing process, the need for additional material or other changes in approach that would serve to strengthen the text. Once a manuscript is completed, it is peer reviewed to ensure that chapters communicate accurately the essential ingredients of the science and technologies under discussion.

It is my goal to maintain the style and quality of books in the series and to further expand the topic areas to include new emerging fields as they become of interest to our reading audience.

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Preface

This text requires little or no prior knowledge of displays by the reader and only a brief knowledge in the sciences. Therefore, it begins by discussing the fundamentals, commencing with a definition of the lumen, and develops other key concepts such as luminous flux, luminous density, contrast, and gray levels. Every effort has been made to present a simple building-block approach that allows the inter-relation and solidity of these terms to be well understood.

Examples of the many existing display technologies in fielded military systems are discussed, including fading technologies such as cathode ray tubes (CRTs), but also and especially advancing technologies such as active matrix liquid crystal displays (AMLCDs) and active matrix organic light-emitting diodes (AMOLEDs). These discussions are then followed by a look at major display device subcomponents: backlights, polarizers, dimming circuitry, diffusers, light-enhancement filters, color filters, etc.

In Chapter 4, military platform categories and groups are outlined, as these set a basis for design parameters. Fundamental display characteristics are defined (e.g., size, direct or virtual view, head-up or head-down display, low or high information content), further delineating displays, regardless of platform. Design class is included as a way of looking at Department of Defense (DoD) displays according to investment dollars and industrial base.

A major thrust of this tutorial is an overview of the military display market itself, including performance parameter tables for fixed and rotary-wing aircraft, tracked and wheeled vehicles, dismounted soldiers and downed pilots, and command and control (C2) facilities. Included are a number of other tables that lay out more generalized trends in the DoD market, e.g., display size as a percentage of DoD market share, defense display market by technology, defense display market by design class, and identification of vanishing vendor and aging technologies by DoD platform group.

The reader will benefit from this work by gaining a working knowledge of display fundamentals as well as broad insight into the strength and vigor of the DoD display market. With more than 640 weapon-system platforms and 1,200,000 force-projection displays, the DoD display arena is indeed a rather large and growing niche market.

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