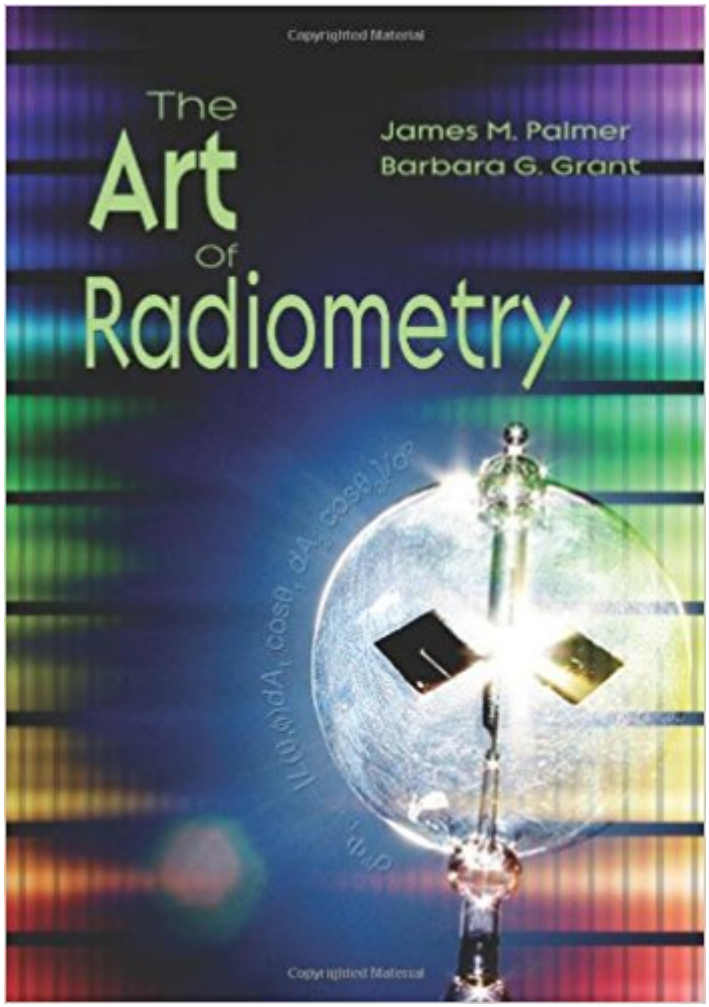
The Art Of Radiometry (SPIE Press Monograph Vol. PM184)



Synopsis

The material from this book was derived from a popular first-year graduate class taught by James M. Palmer for over twenty years at the University of Arizona College of Optical Sciences. This text covers topics in radiation propagation, radiometric sources, optical materials, detectors of optical radiation, radiometric measurements, and calibration. Radiometry forms the practical basis of many current applications in aerospace engineering, infrared systems engineering, remote sensing systems, displays, visible and ultraviolet sensors, infrared detectors of optical radiation, and many other areas. While several texts individually cover topics in specific areas, this text brings the underlying principles together in a manner suitable for both classroom teaching and a reference volume that the practicing engineer can use. The level of discussion of the material is suitable for a class taught to advanced undergraduate students or graduate students. Although this book is not a theoretical treatment, the mathematics required to understand all equations include differential and integral calculus. This text should be foremost in the toolkit of the practicing engineer or scientist working on radiometric problems in areas of optical engineering, electro-optical engineering, systems engineering, imagery analysis, and many others, allowing the technical professional to successfully apply radiometric principles in his or her work.

Book Information

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Customer Reviews

James M. Palmer (1937-2007) was a research professor emeritus in the College of Optical Sciences, University of Arizona. He received his AB in physics from Grinnell College in 1959, and

his MS and PhD degrees in optical sciences in 1973 and 1975, respectively, from the University of Arizona, specializing in radiometry and infrared systems. Prior to attending the University of Arizona, he worked in industrial positions at Hoffman Electronics Corporation and Centralab, Semiconductor Division of Globe Union, Inc. Over a career spanning more than 40 years, he authored or coauthored more than 60 technical papers on many aspects of radiometry and photometry, and he was named Fellow of SPIE in 2003. Other awards include a NASA Group Achievement award for his work on the Pioneer Venus Mission (1979), a Tau Beta Pi Teacher of the Year Award (1992), and a Non-Traditional Student Teaching Award from the University of Arizona (1993). He taught numerous short courses at SPIE conferences, CIE meetings, and conferences of the Optical Society of America. He served as a consultant on commercial and government projects. Dr. Palmer was a brilliant lecturer whose former students, worldwide, have expressed gratitude for the knowledge they gained under his tutelage. Barbara G. Grant received her BA in mathematics from San Jose State University in 1983, and her MS in optical sciences from the University of Arizona in 1989, where her graduate research focused on the absolute radiometric calibration of spaceborne imaging sensors. She was subsequently employed at Lockheed Missiles and Space Company, Sunnyvale, California, where supported by excellent management, she pursued problems in infrared sensor calibration and postflight data analysis of electro-optical payloads. She also worked as a NASA contractor, overseeing integration and test of imager and sounder payloads on the GOES weather satellite, for which she received two NASA awards. She is the author of two book-length volumes of market research for process spectroscopy instruments. Since 1995, her consultancy, Lines and Lights Technology, has addressed problems in systems engineering, infrared imaging and data analysis, UV measurement, and spectroradiometry, among other areas.

Great reference. The only complaint that I have is that it seems that publishers of scientific books are ambiguous with their formulas. Instead of "W/m^2 sr", I would like to either see W/(m^2*sr) or (WÃƒâ Ã Â m^(ÃƒÂ¢Ã Ë†Ã â ™2)Ãƒâ Ã Â sr^(ÃƒÂ¢Ã Ë†Ã â ™1)). Because of order of operation rules (PEMDAS), one might be led to believe W/m^2 sr could be (W*m^2)*sr. I had to check online for a sanity check to make sure that the steradians (sr) belonged in the denominator position. I don’t mean to be so "nit-picky" but it’s one of my pet peeves when people get sloppy with mathematical notation. I’ve seen some books that If I fixed all the bad mathematical notation, I could republish the book without infringing any copyright laws.

Although the title leaves out the word science, there should be no doubt that this volume addresses

the science behind the art of radiometry, and in a very easily digestible manner. In fact, this volume addresses the basis for remote sensing technologies as well as the basis for observational astronomy. Unfortunately, many programs of study in Earth and space science ignore the instruments which allow us to study the Earth from space or distant celestial objects. Some observational courses are merely data analysis courses. However, it would be well worth it for all students of remote sensing and astronomy to understand the very nature of the instruments which provide these scientists their data. This volume is extremely well written, as if you can still hear the lead author posthumously teaching his students. In fact it is a student of the lead author who saw the completion of the volume, like Copernicus' students saw his opus published. Unfortunately, Palmer did not see his own opus published, having died in 2007. This volume contains an enormous amount of references, and its appendices are themselves a treasure trove of information for scientist and engineer alike. Its handling of error, noise and signal-to-noise ratio is deftly accomplished in chapter 7. Two examples of the writing style are: "it is usually very helpful to be able to see exactly what is being measured" (p.224); and, "if you are really doing optics, you get photons under your fingernails" (p.4). The only difficulty in using this book as a text for a course, at the upper undergraduate level or beginning graduate level, is the lack of questions and problems at the end of each chapter.

Radiometry is a relatively straightforward field of science, but the details are scattered over many sub-specialties of science and engineering such as optics, mechanical engineering heat transfer, radiometric calibration, infrared systems, remote sensing, and physics. The subject has been covered by other books, but Dr. Palmers version is easy to read for the beginner, has plenty of figures & tables to aid comprehension, and most importantly is presented in a way that promotes understanding. Even though it is suggested as a graduate level textbook, I feel it would be better as the basis of a great undergraduate course. It would also be valuable for practicing engineers & physicists to learn the subject on their own via self study, or just as a general reference for optics designers. I've been a practicing Radiometric Systems Physicist in industry for over 25 years and wish I had had such a valuable work when I started in the field. There are many practical techno-tidbits and references to important considerations in other fields (detectors in particular, but also NIST and other standards) as well as cross-references to source papers and texts that make this a better introductory book than the dry, soporific, only theoretically oriented pages of other texts. It is definitely worth the price.The Art of Radiometry (SPIE Press Monograph Vol. PM184)

Radiometry is not very well understood topic in optics. This is a great book to shed light on the topic of radiometry, including photometry, which is radiometry with respect to the human eye. Radiometry has applications from X-ray machines to LEDs. I suggest supplementing this books with other introductions to radiometry books and journal articles about your specific application.

Best book on the subject. Provides clear examples on a conmplex subject. I wish I had this book years earlier. The only downside is the book could use more worked exampled and homework problems.

Not terribly helpful. Chances are if you need this book, you are in a course where you will end up teaching yourself most of the material. It would be great if the book were a little more clear at times. The organization can also be a little counter intuitive.

(Vol. 6) Resolution Enhancement Techniques in Optical Lithography (SPIE Tutorial Texts in Optical Engineering Vol. TT47) Optical Design for Visual Systems (SPIE Tutorial Texts in Optical Engineering Vol. TT45)