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Introduction To Holography

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Theory and Applications

Olga Korotkova

CRC Press
Taylor & Francis Group

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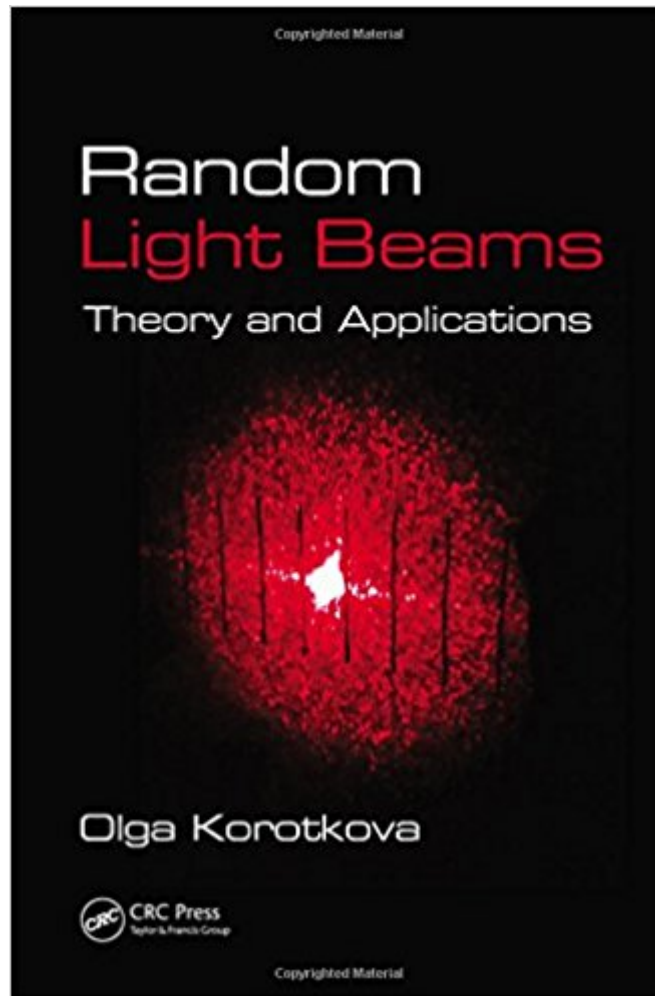
Synopsis

Over the course of its 60-year history, holography has enabled new insights into the nature of light and has contributed to innovative applications, including many unrelated to optics. Introduction to Holography explains how to use holographic techniques to solve specific problems in a variety of fields. The text focuses on the state of development of existing and emerging holographic applications. Numerical problems are provided at the end of each chapter. After a review of essential optics, the book presents basic holographic principles. It introduces the theory of thick holograms, along with a less demanding and more insightful path to important results based on the work of Jacques Ludman. Examining the use of holography in practice, the author then describes the conditions for successful holography in the laboratory, including various lasers commonly used for holography. He also discusses recording materials and their key holographic characteristics. The final portion of the book deals with applications of holography, including imaging, holographic interferometry, holographic optical elements, and data storage. The text also explores digital and computer-generated holography, light-in-flight and first-arriving light techniques and their applications, polarization holography, and holography for sensing applications. Since its invention in 1948, holography has evolved into a mature technology with a wide range of applications. This practical guide to the field offers a comprehensive survey of contemporary holographic techniques and applications.

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Customer Reviews

"This volume reviews a wide range of holographic applications Ã¢â ¬Â| The book is well-structured, with references and practice mathematical problems at the end of each chapter."Ã¢â ¬â ¢Darko Vasiljevic, Optics & Photonics News (OPN), 2013 "Ã¢â ¬Â| the execution of part 4, my favorite, is rather novel. It goes beyond discussions in existing textbooks by focusing on state-of-the-art developments of both classical and more advanced holographic applications. Ã¢â ¬Â| the author has found a good compromise between traditional and emerging ones. Ã¢â ¬Â| the author clearly and carefully explains the physics behind the mathematics and offers sophisticated guidance for experimental work. Problems and references for further reading are provided at the end of each chapter. Toal has written a welcome reference for experienced explorers of the holographic wonderland. Ã¢â ¬Â| ToalÃ¢â ¬â„¢s clear presentation provides a starting point for students and other newcomers and might help orient them toward research that will uncover new explanations."Ã¢â ¬â ¢Wolfgang Osten, Physics Today, January 2013 "This book provides an up-to-date account of holography, covering both theory and applications. Numerical problems are given at the end of each chapter to allow the readers to test their understanding of the material presented and in some cases, to supplement the material in the main text. It will undoubtedly be of use to the researcher in holography and to advanced students of the topic."Ã¢â ¬â ¢Catherine M. Wykes, Contemporary Physics, July 2012 "The breadth of coverage of this book is remarkable, ranging from the underlying physics, to mathematical descriptions and derivations, to the experimental aspects of the art of holography."Ã¢â ¬â ¢Joseph W. Goodman, Stanford University "The structure and approach of the book are excellent. It goes from basic and general concepts in optics to specific devices, systems and examples. The presentation is very clear and easy to understand. Each topic is accompanied with proper figures and is explained very well. The mathematics is at a level appropriate for students in physics or engineering. Ã¢â ¬Â| a great inspiration for any researcher in the area of signal processing."Ã¢â ¬â ¢Joseph Rosen, Ben Gurion University of the Negev "In addition to covering the standard formalism of conventional and digital holography, Introduction to Holography presents such up-and-coming techniques as holographic optical trapping and holographic video microscopy Ã¢â ¬Â|Ã Â a timely book and a very good introduction to the present state of the discipline."Ã¢â ¬â ¢David G. Grier, New York University "This is a complete treatise on holography, covering the background optics, the basic principles, the practice and many applications of holograms. With its extensive references to the original literature and homework problems, it is the perfect textbook for a course on holography. I thoroughly recommend it to both students and experienced practitioners of the subject."Ã¢â ¬â ¢Chris Dainty, National University of Ireland, Galway "Vincent Toal provides a detailed technical overview of

holography that should be regarded as essential reading for those involved with photonics, a primary reference worth purchasing."Ã¢â ¬â ¢Martin Richardson, DeMontfort University, Leicester "Introduction to Holography is a lucid introductory textbook for students and a valuable reference text for specialists. The author provides easy-to-follow derivations of the mathematical foundations of holography, while giving practical advice on how to implement holography for a wide variety of applications."Ã¢â ¬â ¢David Nolte, Purdue University

Vincent Toal is director of the Center for Industrial and Engineering Optics at the Dublin Institute of Technology. A fellow of the Institute of Physics, Dr. Toal has taught optics for over 20 years. He earned a Ph.D. in electronic engineering from the University of Surrey.

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