

Optical Document Security

THIRD EDITION



Rudolf L. von Rienecke



Optical Document Security Third Edition

Rudolf L. Van Renesse



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Optical Document Security Rudolf L. Van Renesse, 2005-01 Now in its third edition Optical Document Security has transformed from a compilation of related topics on the subject to a comprehensive and cohesive treatment of all aspects of optical document security written by a leading expert with decades of experience This completely revised and updated edition brings you to the cutting edge of this field with new coverage of paper based security printed security security evaluation and features and biometrics

Optical Document Security Rudolf L. Van Renesse, 1994-01-01

Optical Document Security: Measurement, Characterization and Visualization Mikael Lindstrand, 2019-04-12 Documents of high value such as passports tickets and banknotes facilitate means for authentication Authentication processes aim at mitigating counterfeit passable products The arsenal of security features in the business is abundant but an effective and reliable counterfeit mitigating system need an architectural approach rather than either relying on one feature only or vaguely motivated aggregated security features Optically variable device OVD is a concept in the industry including costefficient and unique authentication functionality OVD based features may serve as the main counterfeit mitigating functionality as in banknotes For higher value documents such as passports security architectural design may include multimodal combined features in which OVD is one characterizing and necessary aspect Thereby a successful counterfeit need not only to simulate hack electronic based security features such as radio frequency based identifier combined with public key infrastructure based cryptography PKI but also simulate OVD functionality Combined feature authentication based e g on PKI and OVD that relies on principally different physics and hence technology competences is of especial interest Well architected and implemented such multimodal counterfeit mitigating systems are effective to the degree that producing passable products requiring more resources than potentially illegitimately gained by the counterfeiter Irrespective of level of ambition and efforts spent on counterfeit mitigation OVD remains critically important as a security concept One feature of OVD is the possibility to include a human inspector in the authentication procedure Including such man in the loop reduces the risk of successful and unnoticed simulations of algorithms such as PKI One challenge of OVD is a lack of standards or even measurements characterizing the significant aspects influencing a human based inspection This thesis introduces a system able to measure characterize and visualize the significant aspects influencing a human based inspection of OVD features The contribution includes the development of a multidimensional and high dynamic range HDR color measurement system of spatial and angular resolution The capturing of HDR images is particularly demanding for certain high contrast OVD features and require innovative algorithms to achieve the necessary high contrast sensitivity function of the imaging sensor Representing the significant aspects influencing a human based inspection of OVD requires a considerable amount of data The development of an appropriate information protocol is therefore of importance to facilitate further analysis data processing and visualization The information protocol transforming the measurement data into characterizing information is

a second significant achievement of the presented work in this thesis To prove the applicability measurements visualizations and statistically based analyses have been developed for a selection of previously unsolved problems as defined by senior scientists and representatives of central banks Characterization and measurements of the degree to which OVD deteriorate with circulation is one such problem One particular benefit of the implemented suggested solution is the characterization and measurement aim at aspects influencing human based first line inspection The principally difference in the problems treated indicates the generality of the system which is a third significant project achievement The system developed achieves the accuracy and precision including a resolution dynamic range and contrast sensitivity function required for a technology independent standard protocol of optical document security OVDs These abilities facilitate the definition and verification of program of requirements for the development of new security documents Adding also the capability of interlinking first second and third line inspection based characterizations may prove a particular valuable combination which is a fourth significant project achievement The information content Entropy of characterized OVDs and OVD production limitations in combination opens for OVD based novel applications of physically unclonable functions PUF This is of significance as it would generalize the established OVDs to facilitate multimodal verification including PUF verification The OVDs would thereby transform into a combined PUF first line inspection facilitating security feature Optical Document Security in High

Volume Office Environments Joost van Beusekom,2010

Optical Security and Counterfeit Deterrence Techniques

,2006 **Electromagnetic and Photonic Simulation for the Beginner: Finite-Difference Frequency-Domain in**

MATLAB® Raymond C. Rumpf,2022-01-31 This book teaches the finite difference frequency domain FDFD method from the simplest concepts to advanced three dimensional simulations It uses plain language and high quality graphics to help the complete beginner grasp all the concepts quickly and visually This single resource includes everything needed to simulate a wide variety of different electromagnetic and photonic devices The book is filled with helpful guidance and computational wisdom that will help the reader easily simulate their own devices and more easily learn and implement other methods in computational electromagnetics Special techniques in MATLAB are presented that will allow the reader to write their own FDFD programs Key concepts in electromagnetics are reviewed so the reader can fully understand the calculations happening in FDFD A powerful method for implementing the finite difference method is taught that will enable the reader to solve entirely new differential equations and sets of differential equations in mere minutes Separate chapters are included that describe how Maxwell s equations are approximated using finite differences and how outgoing waves can be absorbed using a perfectly matched layer absorbing boundary With this background a chapter describes how to calculate guided modes in waveguides and transmission lines The effective index method is taught as way to model many three dimensional devices in just two dimensions Another chapter describes how to calculate photonic band diagrams and isofrequency contours to quickly estimate the properties of periodic structures like photonic crystals Next a chapter presents how to

analyze diffraction gratings and calculate the power coupled into each diffraction order This book shows that many devices can be simulated in the context of a diffraction grating including guided mode resonance filters photonic crystals polarizers metamaterials frequency selective surfaces and metasurfaces Plane wave sources Gaussian beam sources and guided mode sources are all described in detail allowing devices to be simulated in multiple ways An optical integrated circuit is simulated using the effective index method to build a two dimensional model of the 3D device and then launch a guided mode source into the circuit A chapter is included to describe how the code can be modified to easily perform parameter sweeps such as plotting reflection and transmission as a function of frequency wavelength angle of incidence or a dimension of the device The last chapter is advanced and teaches FDTD for three dimensional devices composed of anisotropic materials It includes simulations of a crossed grating a doubly periodic guided mode resonance filter a frequency selective surface and an invisibility cloak The chapter also includes a parameter retrieval from a left handed metamaterial The book includes all the MATLAB codes and detailed explanations of all programs This will allow the reader to easily modify the codes to simulate their own ideas and devices The author has created a website where the MATLAB codes can be downloaded errata can be seen and other learning resources can be accessed This is an ideal book for both an undergraduate elective course as well as a graduate course in computational electromagnetics because it covers the background material so well and includes examples of many different types of devices that will be of interest to a very wide audience

The Theory of the Moiré Phenomenon Isaac Amidror,2007-03-16 Since The Theory of the Moiré Phenomenon was published it became the main reference book in its field It provided for the first time a complete unified and coherent theoretical approach for the explanation of the moiré phenomenon starting from the basics of the theory but also going in depth into more advanced research results However it is clear that a single book cannot cover the full breadth of such a vast subject and indeed this original volume admittedly concentrated on only some aspects of the moiré theory while other interesting topics had to be left out Perhaps the most important area that remained beyond the scope of the original book consists of the moiré effects that occur between correlated random or aperiodic structures These moiré effects are known as Glass patterns after Leon Glass who described them in the late 1960s However this branch of the moiré theory remained for many years less widely known and less understood than its periodic or repetitive counterpart Less widely known because moiré effects between aperiodic or random structures are less frequently encountered in everyday life and less understood because these effects did not easily lend themselves to the same mathematical methods that so nicely explained the classical moiré effects between periodic or repetitive structures

Signal Processing and Performance Analysis for Imaging Systems S. Susan Young,Ronald G. Driggers,Eddie Lynn Jacobs,2008 This book presents today's most powerful signal processing techniques together with methods for assessing imaging system performance when each of these techniques is applied This multi use book helps you make the most of sensor hardware through software enhancement and evaluate system and algorithm performance You also

learn how to make the best hardware software decisions in developing the next generation of image acquisition and analysis systems

The Hologram Martin J. Richardson, John D. Wiltshire, 2017-11-13 The practical and comprehensive guide to the creation and application of holograms Written by Martin Richardson an acclaimed leader and pioneer in the field and John Wiltshire The Hologram Principles and Techniques is an important book that explores the various types of hologram in their multiple forms and explains how to create and apply the technology The authors offer an insightful overview of the currently available recording materials chemical formulas and laser technology that includes the history of phase imaging and laser science Accessible and comprehensive the text contains a step by step guide to the production of holograms In addition The Hologram outlines the most common problems encountered in producing satisfactory images in the laboratory as well as dealing with the wide range of optical and chemical techniques used in commercial holography The Hologram is a well designed instructive tool involving three distinct disciplines physics chemistry and graphic arts This vital resource offers a guide to the development and understanding of the recording of materials optics and processing chemistry in holography and Discusses the pros and cons of the currently available recording materials Provides tutorials on the types of lasers required and optical systems as well as diffraction theory and wave front reconstruction Details the chemical formulations for processing techniques Researchers and technicians working in academia and those employed in commercial laboratories on the production of holograms as well as students of the sciences will find The Hologram to be a comprehensive and effective resource

Natural Photonics and Bioinspiration Olivier Deparis, Sébastien R. Mouchet, 2021-09-30 Photonic structures occurring in biological tissues such as butterfly wings beetle elytra or fish scales are responsible for a broad range of optical effects including iridescence narrow band reflection large solid angle scattering polarization effects additive color mixing fluid induced color changes controlled fluorescence Studies have provided understanding of the underlying optical mechanisms and the biological functions as well as inspiration for the design and development of novel photonic devices also called bioinspiration In this forward thinking book the research related to photonic structures in natural organisms is reviewed with a main fo

Photonic structures occurring in biological tissues such as butterfly wings beetle elytra or fish scales are responsible for a broad range of optical effects including iridescence narrow band reflection large solid angle scattering polarization additive color mixing fluid induced color changes and controlled fluorescence This book reviews research of biological photonic devices in accordance with the fundamental aspects of physical optics and environmental biology It provides readers with an understanding of numerical modelling based on morphological and optical characterizations as well as the quantitative treatment of color vision This forward thinking book ties these concepts to the design and synthesis of bioinspired photonic devices and opens the door to the applications of nature s lessons in the technical world This resource introduces a methodology for working with and utilizing bioinspiration It includes the experimental and numerical tools necessary for the characterization and simulation of photonic structures and uses original concepts as examples with a focus

on bioinspired hydrochromatic materials Professionals are brought up to speed on a variety of fabrication techniques and methods of synthesis all following a straightforward bottom up or top down approach The reader will gain an understanding of the capability of bioinspiration to meet human needs This book s explanation of how natural photonics structures behave as efficient solar absorbers or thermal management devices makes it a useful resource for technical professionals in the field of energy and environment and the concepts presented in this book also have applications in the designs of optical coatings sensors and light sources

Display Technologies and Applications for Defense, Security, and Avionics John T. Thomas, Andrew Malloy, 2007 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high quality conferences in the broad ranging fields of optics and photonics These books provide prompt access to the latest innovations in research and technology in their respective fields Proceedings of SPIE are among the most cited references in patent literature

Optical Document Security II Rudolf L. Van Renesse, Reconnaissance International, Reconnaissance International Ltd, 2010 [Guide to Information Sources in the Forensic Sciences](#) Cynthia Holt, 2006 Thanks to the O J Simpson case not to mention the overwhelming success of the CSI franchise the general public is both aware of and curious about the world of forensics i e the investigation and establishment of facts or evidence in a court of law The forensic sciences incorporate the application of principles and methods from a cadre of specialized scientific and technical disciplines to a vast array of criminal and civil legal questions To this end Cynthia Holt has compiled a comprehensive bibliography of resources recommended to support research in the forensic sciences and its various subspecialties Holt s introductory chapter clarifies the distinctions between the major forensic sciences specialties in addition it provides an overview of the hierarchy of various classification systems for the forensics literature The bibliography itself is grouped by type of material e g journals abstracts and indexes books Topics include ballistics DNA analysis etymology expert witnessing and facial imaging reconstruction as well as contributions from academic fields such as anthropology linguistics and engineering Tools are primarily in English with a few non English titles included for reasons of significance With a preface by Professor Moses S Schanfield Chair of the Department of Forensic Sciences at George Washington University

Optical Document Security Reconnaissance International Ltd, 2008 [Monthly Report on General Business and Agricultural Conditions in Federal Reserve District No. 8](#), 2007 **Review**, 2007 [Optical Sensing for Public Safety, Health, and Security](#) Maksymilian Pluta, 2001 **Optical Document Security** Rudolf Van Renesse, 2002-11-12 SPIE

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