



OPTICS AND OPTOELECTRONICS SERIES

# The Optical Transfer Function of Imaging Systems

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TOM L. WILLIAMS

IoP

# Optical Transfer Function Of Imaging Systems

**Joseph Van der Gracht, Optical Society  
of America**

## **Optical Transfer Function Of Imaging Systems:**

**The Optical Transfer Function of Imaging Systems** Thomas Williams,2018-05-04 The Optical Transfer Function of Imaging Systems deals extensively with the theoretical concept of the optical transfer function OTF its measurement and application to imaging devices The OTF is a mathematical entity describing how well the subject is transferred into an image via the lens The book focuses on the practical aspects of using and measuring the OTF It presents the background physics necessary to understand and assess the performance of the great proliferation of electro optical systems including image intensifiers video cameras and thermal imagers Assuming a senior undergraduate level of optics knowledge the book is suitable for graduate courses in optics electro optics and photographic science In addition it is a practical guide for systems designers who require a means of assessing and specifying the performance of imaging systems It is also of interest to physicists and engineers working in all areas of imaging

### **Modulation Transfer Function in Optical and**

**Electro-optical Systems** Glenn D. Boreman,2001 This tutorial introduces the theory and applications of MTF used to specify the image quality achieved by an imaging system It covers basic linear systems theory and the relationship between impulse response resolution MTF OTF PTF and CTF Practical measurement and testing issues are discussed

### Optical Transfer

Functions of Imaging Systems and Circuit Analogs George Koutsogiannakis,1970 Optics and Optical Instruments, Optical Transfer Function, Principles of Measurement of Modulation Transfer Function (MTF) of Sampled Imaging Systems

International Organization for Standardization,1999 **Optics and Optical Instruments** International Organization for Standardization,Organisation Internationale de Normalisation,1999 *The Optical Transfer Function* K. R. Barnes,1971

Introduction to the Optical Transfer Function Charles Sumner Williams,Orville A. Becklund,2002 This work covers spatial frequency spread function wave aberration and transfer function and how these concepts are related in an optical system how they are measured and calculated and how they may be useful

**Optics and Optical Instruments. Optical Transfer Function. Principles of Measurement of Modular Transfer Function (MTF) of Sampled Imaging Systems** British Standards Institute Staff,1999-10-01 Optics Optical instruments Optical measurement Transfer functions Modulation Fourier analysis Mathematical calculations Equations Frequencies Testing conditions Test equipment Holes Position Orientation

Fibre optics Cameras Scanners Video signals Measurements of Optical Transfer Function Discretely Sampled Thermal Imaging Systems ,1992 Measurement of the Optical Transfer Function OTF of discretely sampled thermal imaging systems e g parallel scanned FLIR systems on which analysis is done in the cross scan direction and staring focal plane arrays is

increasingly important as digital image acquisition device technology for the 3 5 and 8 12 micron infrared spectral regions is maturing The traditional measurement methods used for continuous scan systems may not be valid for discretely sampled systems This paper presents results of measurements of the OTF using a translating slit to obtain the Line Spread Function LSF for discretely sampled systems Multiple frame acquisition is used for removal of temporal and fixed pattern noise It is

the intent of this laboratory effort to develop a measurement technique to be used when collecting OTF data for discretely sampled systems The new measurement technique is potentially suitable for all systems and if successful will permit characterization of vertical system MTF If this measurement method is found to be useful it will be used to generate the OTF data used in the NVEOD FLIR92 model for further development and verification of the model *Optics and Photonics*.

*Optical Transfer Function. Principles of Measurement of Modulation Transfer Function (MTF) of Sampled Imaging Systems* British Standards Institute Staff,2008-05-30 Optics Optical instruments Optical measurement Transfer functions Modulation Fourier analysis Mathematical calculations Equations Frequencies Testing conditions Test equipment Holes Position Orientation Fibre optics Cameras Scanners Video signals A System Engineering Approach to Imaging Norman S. Kopeika,1998 This textbook addresses imaging from the system engineering point of view examining advantages and disadvantages of imaging in various spectral regions Focuses on imaging principles and system concepts rather than devices Intended as a senior year undergraduate or graduate level engineering textbook A solution manual is included

**Assessment of Imaging Systems, Visible and Infrared** T. L. Williams,Sira Institute,1981 *Thermal Imaging Systems* J.M. Lloyd,2013-06-29 This book is intended to serve as an introduction to the technology of thermal imaging and as a compendium of the conventions which form the basis of current FUR practice Those topics in thermal imaging which are covered adequately elsewhere are not treated here so there is no discussion of detectors cryogenic coolers circuit design or video displays Useful information which is not readily available because of obscure publication is referenced as originating from personal communications Virtually everyone with whom I have worked in the thermal imaging business has contributed to the book through the effects of conversations and ideas I gratefully proffer blanket appreciation to all those who have helped in that way to make this book possible The contributions of five people however bear special mention Bob Sendall Luke Biberman Pete Laakmann George Hopper and Norm Stetson They more than any others have positively influenced my thinking Introduction to Confocal Fluorescence Microscopy Michiel Muller,2006 This book provides a comprehensive account of the theory of image formation in a confocal fluorescence microscope as well as a practical guideline to the operation of the instrument its limitations and the interpretation of confocal microscopy data The appendices provide a quick reference to optical theory microscopy related formulas and definitions and Fourier theory

**Analysis of Sampled Imaging Systems** Richard H. Vollmerhausen,Ronald G. Driggers,2000 Advances in solid state detector arrays flat panel displays and digital image processing have prompted an increasing variety of sampled imaging products and possibilities These technology developments provide new opportunities and problems for the design engineer and system analyst this tutorial s intended reader **Introduction to Fourier Optics** Joseph W. Goodman,2005 This textbook deals with fourier analysis applications in optics and in particular with its applications to diffraction imaging optical data processing holography and optical communications Fourier analysis is a universal tool that has found application within a wide range of areas in

physics and engineering and this third edition has been written to help your students understand the complexity of a subject that can be challenging to grasp at times Chapters cover foundations of scalar diffraction theory Fresnel and Fraunhofer diffraction moving onto Wave Optics Analysis of Coherent Optical Systems and Wavefront Modulation Joseph Goodman's work in Electrical Engineering has been recognised by a variety of awards and honours so his text is able to guide students through a comprehensive introduction into Fourier Optics Integrated Computational Imaging Systems Joseph Van der Gracht, Optical Society of America, 2002 Digest and expanded papers from a November 2001 meeting offer definitions of integrated imaging present examples of imaging systems and describe concepts from information theory as they apply to the analysis and design of imaging systems Material is in sections on key topics wavefront coding computational microscopes information theory and design imaging systems implementation hyperspectral systems and analysis and situation Three dimensional coherence imaging in the Fresnel domain spatial tomography and coherence microscopy and modeling of sparse aperture telescope image quality are some of the areas discussed Annotation copyrighted by Book News Inc Portland OR

*Digital Image Processing for Medical Applications* Geoff Dougherty, 2009-04-09 Image processing is a hands on discipline and the best way to learn is by doing This text takes its motivation from medical applications and uses real medical images and situations to illustrate and clarify concepts and to build intuition insight and understanding Designed for advanced undergraduates and graduate students who will become end users of digital image processing it covers the basics of the major clinical imaging modalities explaining how the images are produced and acquired It then presents the standard image processing operations focusing on practical issues and problem solving Crucially the book explains when and why particular operations are done and practical computer based activities show how these operations affect real images All images links to the public domain software ImageJ and custom plug ins and selected solutions are available from [www.cambridge.org/books/dougherty](http://www.cambridge.org/books/dougherty) A New Technique for Estimating the Modulation Transfer Function of an Imaging System from Its Edge Response Patrick L. Smith, AEROSPACE CORP EL SEGUNDO CALIF ENGINEERING SCIENCE OPERATIONS, 1971 The optical transfer function OTF is the name given to the two dimensional Fourier transform of an imaging system's impulse response or point spread function where a point source in the field of view is an impulse The modulation transfer function MTF is the modulus of OTF A cross section of the MTF can be estimated from a noisy knife edge image recorded in the film An MTF estimate is useful for system performance analysis if the film effects are backed out and image enhancement The new method for estimating the MTF proposed in this report has two major advantages over other methods reported in the literature the averaging effects of the microdensitometer aperture and the nonlinear film characteristics can be included in the regression equation and the phase errors between successive edge scans are estimated Author **Infrared Imaging Systems**, 1995

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