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| Nota di contenuto | Military Laser Technology for Defense: Technology for Revolutionizing 21st Century Warfare; CONTENTS; PREFACE; ACKNOWLEDGMENTS; ABOUT THE AUTHOR; PART I: OPTICS TECHNOLOGY FOR DEFENSE SYSTEMS; 1 OPTICAL RAYS; 1.1 PARAXIAL OPTICS; 1.2 GEOMETRIC OR RAY OPTICS; 1.2.1 Fermat's Principle; 1.2.2 Fermat's Principle Proves Snell's Law for Refraction; 1.2.3 Limits of Geometric Optics or Ray Theory; 1.2.4 Fermat's Principle Derives Ray Equation; 1.2.5 Useful Applications of the Ray Equation; 1.2.6 Matrix Representation for Geometric Optics; 1.3 OPTICS FOR LAUNCHING AND RECEIVING BEAMS 1.3.1 Imaging with a Single Thin Lens1.3.2 Beam Expanders; 1.3.3 Beam Compressors; 1.3.4 Telescopes; 1.3.5 Microscopes; 1.3.6 Spatial Filters; 2 GAUSSIAN BEAMS AND POLARIZATION; 2.1 GAUSSIAN BEAMS; 2.1.1 Description of Gaussian Beams; 2.1.2 Gaussian Beam with ABCD Law; 2.1.3 Forming and Receiving Gaussian Beams with Lenses; 2.2 POLARIZATION; 2.2.1 Wave Plates or Phase Retarders; 2.2.2 Stokes |

Parameters; 2.2.3 Poincar e Sphere; 2.2.4 Finding Point on Poincar e Sphere and Elliptical Polarization from Stokes Parameters; 2.2.5 Controlling Polarization; 3 OPTICAL DIFFRACTION
3.1 INTRODUCTION TO DIFFRACTION3.1.1 Description of Diffraction; 3.1.2 Review of Fourier Transforms; 3.2 UNCERTAINTY PRINCIPLE FOR FOURIER TRANSFORMS; 3.2.1 Uncertainty Principle for Fourier Transforms in Time; 3.2.2 Uncertainty Principle for Fourier Transforms in Space; 3.3 SCALAR DIFFRACTION; 3.3.1 Preliminaries: Green's Function and Theorem; 3.3.2 Field at a Point due to Field on a Boundary; 3.3.3 Diffraction from an Aperture; 3.3.4 Fresnel Approximation; 3.3.5 Fraunhofer Approximation; 3.3.6 Role of Numerical Computation; 3.4 DIFFRACTION-LIMITED IMAGING
3.4.1 Intuitive Effect of Aperture in Imaging System3.4.2 Computing the Diffraction Effect of a Lens Aperture on Imaging; 4 DIFFRACTIVE OPTICAL ELEMENTS; 4.1 APPLICATIONS OF DOEs; 4.2 DIFFRACTION GRATINGS; 4.2.1 Bending Light with Diffraction Gratings and Grating Equation; 4.2.2 Cosinusoidal Grating; 4.2.3 Performance of Grating; 4.3 ZONE PLATE DESIGN AND SIMULATION; 4.3.1 Appearance and Focusing of Zone Plate; 4.3.2 Zone Plate Computation for Design and Simulation; 4.4 GERCHBERG-SAXTON ALGORITHM FOR DESIGN OF DOEs; 4.4.1 Goal of Gerchberg-Saxton Algorithm
4.4.2 Inverse Problem for Diffractive Optical Elements4.4.3 Gerchberg-Saxton Algorithm for Forward Computation; 4.4.4 Gerchberg-Saxton Inverse Algorithm for Designing a Phase-Only Filter or DOE; 5 PROPAGATION AND COMPENSATION FOR ATMOSPHERIC TURBULENCE; 5.1 STATISTICS INVOLVED; 5.1.1 Ergodicity; 5.1.2 Locally Homogeneous Random Field Structure Function; 5.1.3 Spatial Power Spectrum of Structure Function; 5.2 OPTICAL TURBULENCE IN THE ATMOSPHERE; 5.2.1 Kolmogorov's Energy Cascade Theory; 5.2.2 Power Spectrum Models for Refractive Index in Optical Turbulence
5.2.3 Atmospheric Temporal Statistics

Sommario/riassunto

"Lasers in War will provide the basic konwledge to create, design, and implement laser systems for the battlefield, including only unclassified or declassified information. The first three parts of the book provide background material: optics and lasers for war; propagation of laser light in the atmosphere; and propagation of laser light in fiber and optical waveguides. The nest three parts describe military systems involving propagation through the atmosphere: weapons damage systems military systems for information communication; and military systems for sensing. The last part describes military systems involving propagation through optical fiber. This book is timely, as conflicts of late have accelerated progress in military laser system development. Laser weapons are not only effective for directed energy destruction but also for use against personnel by blinding, for countermeasures against heat seeking IR missiles, and for applications in space where communication and GPS satellites need protection. Practical concerns and limits of laser technology will be addressed in each area of application"--

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