1. Record Nr. UNINA9910784656903321 Autore Hariharan P **Titolo** Basics of interferometry / / P. Hariharan Boston, : Elsevier Academic Press, c2006 Pubbl/distr/stampa **ISBN** 1-280-70770-4 9786610707706 0-08-046545-5 Edizione [2nd ed.] Descrizione fisica 1 online resource (249 p.) Disciplina 535/.470287 Soggetti Interferometry Electric interference Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Description based upon print version of record. Note generali Nota di bibliografia Includes bibliographical references and index. Front cover; Title page; Copyright page; Contents; Preface to the First Nota di contenuto Edition: Preface to the Second Edition: Acknowledgments: 1 Introduction; 2 Interference: A Primer; 2.1 Light Waves; 2.2 Intensity in an Interference Pattern; 2.3 Visibility of Interference Fringes; 2.4 Interference with a Point Source: 2.5 Localization of Fringes: 2.6 Summary; 2.7 Problems; Further Reading; 3 Two-Beam Interferometers; 3.1 Wavefront Division; 3.2 Amplitude Division; 3.3 The Rayleigh Interferometer: 3.4 The Michelson Interferometer: 3.5 The Mach-Zehnder Interferometer: 3.6 The Sagnac Interferometer 3.7 Summary 3.8 Problems; Further Reading; 4 Source-Size and Spectral Effects; 4.1 Coherence; 4.2 Source-Size Effects; 4.3 Spectral Effects; 4.4 Polarization Effects; 4.5 White-Light Fringes; 4.6 Channeled Spectra; 4.7 Summary; 4.8 Problems; Further Reading; 5 Multiple-Beam Interference: 5.1 Multiple-Beam Fringes by Transmission; 5.2 Multiple-Beam Fringes by Reflection; 5.3 Multiple-Beam Fringes of Equal Thickness; 5.4 Fringes of Equal Chromatic Order (FECO Fringes); 5.5 The Fabry-Perot Interferometer; 5.6 Summary; 5.7 Problems; Further Reading; 6 The Laser as a Light Source 6.1 Lasers for Interferometry 6.2 Laser Modes; 6.3 Single-Wavelength

Operation of Lasers; 6.4 Polarization of Laser Beams; 6.5 Wavelength Stabilization of Lasers; 6.6 Laser-Beam Expansion; 6.7 Problems with

Laser Sources; 6.8 Laser Safety; 6.9 Summary; 6.10 Problems; Further Reading; 7 Photodetectors; 7.1 Photomultipliers; 7.2 Photodiodes; 7.3 Charge-Coupled Detector Arrays; 7.4 Photoconductive Detectors; 7.5 Pyroelectric Detectors; 7.6 Summary; 7.7 Problems; Further Reading; 8 Measurements of Length; 8.1 The Definition of the Metre; 8.2 Length Measurements

8.3 Measurements of Changes in Length 8.4 Summary: 8.5 Problems: Further Reading; 9 Optical Testing; 9.1 The Fizeau Interferometer; 9.2 The Twyman-Green Interferometer; 9.3 Analysis of Wavefront Aberrations; 9.4 Laser Unequal-Path Interferometers; 9.5 The Point-Diffraction Interferometer; 9.6 Shearing Interferometers; 9.7 Grazing-Incidence Interferometry: 9.8 Summary: 9.9 Problems: Further Reading: 10 Digital Techniques; 10.1 Digital Fringe Analysis; 10.2 Digital Phase Measurements; 10.3 Testing Aspheric Surfaces; 10.4 Summary; 10.5 Problems: Further Reading: 11 Macro- and Micro-Interferometry 11.1 Interferometry of Refractive Index Fields 11.2 The Mach-Zehnder Interferometer; 11.3 Interference Microscopy; 11.4 Multiple-Beam Interferometry: 11.5 Two-Beam Interference Microscopes: 11.6 The Nomarski Interferometer; 11.7 Summary; 11.8 Problems; Further Reading: 12 White-Light Interference Microscopy: 12.1 White-Light Interferometry: 12.2 White-Light Phase-Shifting Microscopy: 12.3 Spectrally Resolved Interferometry: 12.4 Coherence-Probe Microscopy: 12.5 Summary; 12.6 Problems; Further reading; 13 Holographic and Speckle Interferometry: 13.1 Holographic Interferometry 13.2 Holographic Nondestructive Testing

Sommario/riassunto

Optical interferometry is used in communications, medical imaging, astronomy, and structural measurement. With the use of an interferometer engineers and scientists are able to complete surface inspections of micromachined surfaces and semiconductors. Medical technicians are able to give more concise diagnoses with the employ of interferometers in microscopy, spectroscopy, and coherent tomography. Originating from a one-day course, this material was expanded to serve as an introduction to the topic for engineers and scientists that have little optical knowledge but a need for more in the