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Nota di contenuto	Basics of Confocal Scanning Laser Microscopy (CSLM) -- The Point Spread Function (PSF) for Some Modulated Apertures -- Computation of Coherent Transfer Functions (CTFs) for Some Modulated Apertures -- The Imaging of Microscopic Objects Using a Confocal Microscope -- Theoretical Study of a Coherent Non-scanned Laser Microscope (CNSM) -- Computation of the Lateral and Axial Point Spread Functions in Confocal Imaging Systems Using Binary Amplitude Mask -- Exenteration Errors Combined with Wavefront Aberration -- Aberration Studies Using a Confocal Scanning Laser Microscope -- Spatial Coherence in Confocal Microscopy for Quadratic Radially Distributed Apertures -- Spatial Coherence in Confocal Microscopy for Black and

White Annular Apertures -- Application of Confocal Laser Scanning Microscopy to Cardiac Images.

Sommario/riassunto

This book provides a thorough exploration of various modulated apertures and their impact on improving microscope resolution, with a focus on confocal scanning laser microscopy (CSLM). Over the course of eleven chapters, it looks at both the theoretical aspects and practical applications of different aperture shapes. Chapters 1 and 2 review apertures with linear, quadratic, and concentric black-and-white (B/W) zones, along with linear-quadratic and polynomial designs. Additionally, apertures with Hamming, Cauchy, rectangular, and hexagonal shapes are analyzed for their potential to enhance imaging performance. Chapter 3 presents the computation of coherent transfer functions (CTFs) for selected modulated apertures, offering insights into their influence on imaging quality. Chapter 4 focuses on confocal microscopes, exploring how these apertures affect the imaging of microscopic objects. A theoretical study of coherent non-scanned laser microscopes (CNSM) is covered in Chapter 5. Chapter 6 addresses the computation of lateral and axial point spread functions (PSFs) in confocal imaging systems that use binary amplitude masks, while Chapter 7 investigates the effects of misalignment errors combined with wavefront aberrations in systems using linear and quadratic apertures. In Chapter 8, diffraction intensity is calculated for a confocal microscope with a laterally displaced truncated Gaussian aperture, extending the principles of Marechal microscopy to confocal scanning microscopy. Chapters 9 and 10 examine spatial coherence in confocal optical systems, particularly in the context of quadratic and concentric B/W apertures. The book concludes in Chapter 11 with an application of cardiac apertures in CSLM, demonstrating their use in processing cardiac images. This work serves as a valuable reference for researchers and professionals interested in advancing microscope resolution through innovative aperture design and analysis.