

Lens Design for Imaging

Volume 1: Fundamentals of Optical Systems

Master the foundational principles that drive successful optical system design in modern imaging applications

Lens Design for Imaging ? Volume 1: Fundamentals of Optical Systems, by Herbert Gross, delivers a comprehensive discussion of the theoretical foundations of optical systems. Gross draws on his extensive industrial and academic experience in lens design to close the gap between purely theoretical examinations of lens design and practical application. The author provides a systematic and robust methodology for lens design that guides you through the conceptual design, analysis, and optimization of complex imaging systems across diverse applications. In this first volume the basic preconditions to understand optical imaging systems are presented.

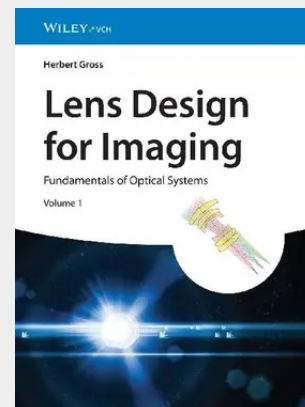
The book covers twelve domains of optical system fundamentals, from material properties and geometrical optics to advanced topics, like diffraction theory, Fourier optics, and digital image processing. Each chapter combines rigorous theory with illustrations and hands-on examples, making complex concepts accessible while maintaining the mathematical depth demanded by professional practice. Lens Design for Imaging ? Volume 1 encompasses the necessary knowledge and critical review about optical materials dispersion, the geometrical optics approximation, ray tracing methodologies, component design principles, imaging system theory, physical optics effects, and modern computational approaches.

Readers will also find:

- * Comprehensive coverage of optical materials including dispersion models, in particular for short pulse systems, absorption and thermal properties, and specialized materials for UV, IR, and consumer applications
- * Detailed ray tracing methods with complete equation sets for aspherical surfaces, gradient media, and diffractive elements
- * Presentation of physical models for diffraction effects, point spread functions, and optical transfer functions of optical systems, with practical calculation schemes with discussion of approximations and limitations
- * Advanced topics, including Gaussian beam propagation, limits of Gaussian beam models, photometric analysis, and phase space representations for system analysis
- * An integrated approach to digital imaging methods covering realistic image simulation, enhancement techniques, and modern imaging modalities

Perfect for optical engineers, lens designers, and advanced students in optics and photonics, Lens Design for Imaging ? Volume 1 provides authoritative coverage of optical system fundamentals. It contains the systematic knowledge practitioners and students require to tackle complex design challenges.

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