

1. Record Nr.	UNINA9911004812703321
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Titolo	Introduction to imaging spectrometers / / William L. Wolfe
Pubbl/distr/stampa	Bellingham, Wash., : SPIE Optical Engineering Press, c1997
ISBN	1-61583-741-8 0-8194-7854-7
Descrizione fisica	1 online resource (162 p.)
Collana	Tutorial texts in optical engineering ; ; v. TT 25
Disciplina	621.36/1
Soggetti	Spectrometer Imaging systems - Design and construction
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1. Introduction -- The Scheme of This Text -- The Future -- References and Bibliography. 2. Optics overview -- Photons, Waves, and Rays -- The Detection of Radiation -- Interference -- Wavefronts, Normals, Beams, and Rays -- Refractive Index -- The Laws of Reflection and Refraction -- Total Internal Reflection -- Diffraction -- Geometric Optics and Optical Design -- The Idealized Thin Lens -- The Lens Maker's Equation -- Aberrations -- Bending the Lens. 3. Radiometry review -- Definitions of Important Radiometric Quantities -- Radiative Transfer -- Solid Angle and Speed -- Stops and Pupils. 4. Spectrometer specifications -- Spectral Variables -- Resolution -- Resolving Power. 5. Imaging introduction -- The Field of View -- Scanners -- Strip Mappers -- Pushbroom Scanners -- Whiskbroom Scanners. 6. Detector descriptions -- Descriptors -- Properties of Elemental Detectors -- Properties of Detector Arrays -- Fundamental Limits. 7. System sensitivity -- Specification -- Charge-Collecting Detectors -- Summary of Figures of Merit. 8. Filter phenomena -- Types of Filters -- One-Layer Filters -- Multilayer Filters -- Circular and Linear Variable Filters -- Fabry-Perot Filters -- Acousto-Optical Filters. 9. Prism spectrometers -- Prism Deviation -- Minimum Deviation --

Geometric Layout -- Resolution and Resolving Power -- Throughput -- An Example.

10. Grating spectrometers -- Diffraction Theory -- Geometric Layout -- Resolution and Resolving Power -- Throughput -- Blazing Rulings -- Operation.

11. Michelson interferometer spectrometers -- Two-Beam Interference -- Interference in the Michelson Interferometer -- The Twyman-Green Interferometer -- The Fourier Transform Spectrometer -- Throughput and Sensitivity.

12. An imaging Fourier transform spectrometer -- Monochromatic Operation -- Field Operation.

13. Fabry-Perot interferometer spectrometers -- Description -- Spectral Transmission -- Resolving Power, Throughput, and Free Spectral Range -- The Fabry-Perot Imaging Spectrometer.

14. A challenging application -- Requirements -- The (Up)Front-Filter Approach -- The Rear (FPA) Filter Approach -- The Multiple-Lens Filter Approach -- The Acousto-Optic Filter -- The Grating Approach -- The FTS Approach -- Sensitivity Calculations.

15. A satellite spectrometer -- Requirements -- Analysis -- Another Way to Calculate.

16. A Mars Rover experiment -- Requirements Definitions -- The Martian Environment -- Optical Properties of (Martian?) Minerals -- The Candidate Imaging Spectrometers -- Two-Dimensional Array Systems -- Possible Improvements.

17. Some trade-offs -- General Considerations -- Optical Efficiency -- Bandwidth -- Sensitivity -- Examples.

18. Other examples -- The Westinghouse AOTF System -- HYDICE -- TRW Devices.

Appendix to Chapter 2, Optics operations -- Derivation of the Wave Equation from Maxwell's Equations -- Representation of Fields -- The Poynting Vector -- Derivation of Snell's Law -- Interference -- Diffraction -- The Thin Lens -- Refraction at a Spherical Surface -- The Aberrations -- Bending the Lens -- Appendix to Chapter 6, Detectors -- The Signal -- The Noise -- The Noises -- Expressions for the Limiting Specific Detectivities -- Appendix to Chapter 9, Prisms -- Throughput -- Slit Sizes and Resolution -- Deviation -- Dispersion -- Some Mounting Arrangements -- Appendix to Chapter 10, Gratings -- The Grating Diffraction Pattern -- The Grating Equation -- Resolving Power -- Free Spectral Range -- Some Mounting Arrangements -- Appendix to Chapter 12, FTS foundations -- Resolution -- Resolving Power -- Sensitivity -- Apodization.

Sommario/riassunto

The increased interest in imaging spectroscopy has arisen largely for technical reasons. This Tutorial Text first reviews the required background in optics, radiometry, imaging, spectral sensing and focal plane arrays. Then the principles of these subjects are applied to several specific problems to illustrate the way in which such instruments can be designed.
