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| Nota di contenuto | Free-Space Optics; Table of Contents; Introduction; Chapter 1. History of Optical Telecommunications; 1.1. Some definitions; 1.1.1. Telecommunication; 1.1.2. Optical transmission; 1.1.3. Radio or Hertzian waves; 1.2. The prehistory of telecommunications; 1.3. The optical air telegraph; 1.4. The code; 1.5. The optical telegraph; 1.6. The heliograph or solar telegraph: a portable telecommunication system; 1.7. Alexander Graham Bell's photophone; Chapter 2. Basic Principles of Electromagnetism; 2.1. Introduction; 2.2. Maxwell's equations in an unspecified medium 2.3. Propagation of electromagnetic waves in an isotropic and linear homogeneous medium 2.4. Energy associated with a wave; 2.5. Propagation of a wave in a non-homogeneous medium; 2.6. Coherent and incoherent waves; 2.7. Relations between classical electromagnetism and geometrical optics; 2.8. The electromagnetic |

spectrum; 2.9. Units and scales; 2.10. Examples of sources in the visible light and near visible light; 2.11. Conclusion; Chapter 3. Emission and Reception of Optical Beams; 3.1. Foreword; 3.2. Introduction; 3.3. Radiometry: basic concepts
3.4. Optical spectral windows, materials and eye-safety
3.5. Transmitters; 3.5.1. Broad spectrum incoherent light emitting diodes; 3.5.1.1. Structures; 3.5.1.2. Near and far field patterns; 3.5.1.3. Spectral characteristics; 3.5.1.4. Electrical and optical characteristics; 3.5.2. Laser diodes: high radiant power output, coherent waves; 3.5.2.1. Structures; 3.5.2.2. "(transmitted)/(injected) characteristic": static and dynamic; 3.5.2.3. Spectra and near field patterns; 3.5.2.4. Spectral and modal instabilities and light intensity noise
3.5.3. Use of amplifiers with "rare earth ion" doped fibers
3.6. Photodetectors; 3.6.1. Optical spectral range and materials; 3.6.2. Principle of operation and structures; 3.6.2.1. Surface phenomena: optical reflection, charge mobility and current leakage; 3.6.2.2. Absorption and conduction: semiconductor junctions; 3.6.3. Responsivity, response time, junction capacity and dark current; 3.6.4. Photomultipliers and semiconductor avalanche photodiodes; Chapter 4. Line of Sight Propagation; 4.1. Influence of the propagation environment; 4.1.1. Atmospheric absorption; 4.1.2. Atmospheric scattering
4.1.3. Extinction and total spectral transmission
4.1.4. Earth's atmosphere; 4.1.4.1. Atmospheric composition; 4.1.4.2. Aerosols; 4.2. Visibility; 4.2.1. Generalities; 4.2.1.1. Definitions; 4.2.1.2. Units and scales; 4.2.1.3. Meteorology needs; 4.2.1.4. Measurement methods; 4.2.2. Visual estimate of the meteorological optical range; 4.2.2.1. General; 4.2.2.2. Estimate of the day time meteorological optical range; 4.2.2.3. Estimate of the night time meteorological optical range; 4.2.2.4. Estimate of the meteorological optical range in the absence of distant reference markers
4.2.3. Meteorological optical range measurement instruments

Sommario/riassunto

Free space optics is a telecommunications technique which is already being used for everyday exchange of information and has many advantages over other techniques (bandwidth, low cost, mobility of the equipment, security, etc.); within the next decade, it is likely to become an integral and essential part of data-processing architectures and telecommunications. A history of wireless optical telecommunications is given, together with a recapitulation of the application of the principles of electromagnetism to free-space optics. Coverage is also given to the transmitters and receivers of opti
