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the effective index  $N_m$ ; 3.2.5. Waveguide parameter determination

3.3. Optical losses 3.3.1. Optical losses origin; 3.3.2. Optical loss measurements; 3.3.3. Characterization in near-field microscopy of optical waveguides; 3.4. Bibliography; Chapter 4. Non-linear Effects in Integrated Optics; 4.1. General considerations; 4.2. Second harmonic generation; 4.2.1. Second harmonic generation in the volume; 4.2.2. Quasi-phase matching (QPM); 4.2.3. Fabrication of periodically poled structures; 4.3. Second harmonic generation within waveguides; 4.3.1. Overlap integral calculation; 4.4. Non-linear optical characterization of waveguides; 4.4.1. SHG setup

4.4.2. Second harmonic generation by reflection 4.4.3. Second harmonic generation in waveguides; 4.5. Parametric non-linear optical effects; 4.5.1. Parametric amplification; 4.5.2. Optical parametric oscillation (OPO); 4.6. Laser sources based on non-linear optics; 4.7. Bibliography; Chapter 5. The Electro-optic Effect in Waveguides; 5.1. Introduction; 5.2. The electro-optic effect; 5.2.1. The case of LiNbO<sub>3</sub>; 5.3. The electro-optic effect in waveguides; 5.3.1. Analysis of the electric field distribution; 5.4. Electro-optic measurement techniques; 5.4.1. The Mach-Zehnder interferometer

5.4.2. The polarization change technique 5.4.3. Angular displacement of guided modes (AnDiGM) technique; 5.5. Optical devices using the electro-optic effect; 5.5.1. Phase modulators; 5.5.2. Intensity modulators; 5.6. Integrated optic setups using the electro-optic effect; 5.6.1. Optimal design of the electrodes for integrated EO modulators; 5.6.2. Integrated EO phase modulator; 5.6.3. Integrated EO intensity modulator (Mach-Zehnder); 5.7. Modulation in optical networks: state-of-the-art; 5.8. Bibliography; Chapter 6. Photonic Crystal Waveguides; 6.1. Dispersion relation

6.1.1. Dispersion relation of an isotropic medium

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## Sommario/riassunto

This book presents the principles of non-linear integrated optics. The first objective is to provide the reader with a thorough understanding of integrated optics so that they may be able to develop the theoretical and experimental tools to study and control the linear and non-linear optical properties of waveguides. The potential use of these structures can then be determined in order to realize integrated optical components for light modulation and generation. The theoretical models are accompanied by experimental tools and their setting in order to characterize the studied phenomenon. Th

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