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Nota di contenuto	<p>INTEGRATED PHOTONICS; CONTENTS; Preface; About the Author; 1 Introduction to Integrated Photonics; Introduction; 1.1 Integrated Photonics; 1.2 Brief History of Integrated Photonics; 1.3 Characteristics of the Integrated Photonic Components; 1.4 Integrated Photonics Technology; 1.5 Basic Integrated Photonic Components; 1.6 Some Examples of Integrated Photonics Devices; 1.7 Structure of the Book; References; Further Reading; 2 Review of the Electromagnetic Theory of Light; Introduction; 2.1 Electromagnetic Waves; 2.1.1 Maxwell's equations: wave equation; 2.1.2 Wave equation in dielectric media 2.1.3 Monochromatic waves 2.1.4 Monochromatic plane waves in dielectric media; 2.1.5 Polarisation of electromagnetic waves; 2.1.6 Light propagation in absorbing media; 2.2 EM Waves at Planar Dielectric Interfaces; 2.2.1 Boundary conditions at the interface; 2.2.2 Reflection and transmission coefficients: reflectance and transmittance; 2.2.3 Total internal reflection; References; Further Reading; 3 Theory of Integrated Optic Waveguides; Introduction; 3.1 Optical Waveguides: Basic Geometries; 3.2 Types of Modes in Planar Optical Waveguides; 3.3 Wave Equation in Planar Waveguides 3.4 Guided Modes in Step-index Planar Waveguides 3.5 Graded-index Planar Waveguides; 3.5.1 Multi-layer approximation; 3.5.2 The ray approximation; 3.5.3 Reconstruction of index profiles: the inverse WKB method; 3.6 Guided Modes in Channel Waveguides; 3.6.1 Marcatili's method; 3.6.2 The effective index method; Notes; References; 4 Coupled Mode Theory: Waveguide Gratings; Introduction; 4.1 Modal Coupling; 4.1.1 Modal orthogonality and normalisation; 4.1.2 Modal expansion of the electromagnetic field; 4.1.3 Coupled mode equations: coupling coefficients; 4.1.4 Coupling mode theory 4.1.5 Co-directional coupling 4.1.6 Contra-directional coupling; 4.2 Diffraction Gratings in Waveguides; 4.2.1 Waveguide diffraction gratings; 4.2.2 Mathematical description of waveguide gratings; 4.2.3 Collinear mode coupling induced by gratings; 4.2.4 Coupling coefficients calculation; 4.2.5 Coupling coefficients in modulation index gratings; 4.2.6 Coupling coefficients in relief diffraction gratings; References; Further Reading; 5 Light Propagation in Waveguides: The Beam Propagation Method; Introduction; 5.1 Paraxial Propagation: Fresnel Equation 5.2 Fast Fourier Transform Method (FFT-BPM) 5.2.1 Solution based on discrete fourier transform; 5.3 Method Based on Finite Differences (FD-BPM); 5.4 Boundary Conditions; 5.4.1 Transparent boundary conditions; 5.5 Spatial Frequencies Filtering; 5.6 Modal Description Based on BPM; 5.6.1 Modal field calculation using BPM; Note; References; Further Reading; Appendix 1 Complex Notation of the Electric and Magnetic Fields; Appendix 2 Phase Shifts for TE and TM Incidence; Appendix 3 Marcatili's Method for Solving Guided Modes in Rectangular Channel Waveguides Appendix 4 Demonstration of Formula (4.3)</p>
Sommario/riassunto	<p>All integrated optical components and devices make use of ""waveguides"", where light is confined by total internal reflection. The elements in such ""photonic chip"" are interconnected through waveguides, and also the integrated optics components themselves are fabricated using waveguide configuration, such as couplers, switches, modulators, multiplexors, amplifiers and lasers, etc. These components are integrated in a single substrate, thus resulting in a compact and robust photonic device, which can be optically connected through</p>

optical fibres. With an increase in the number of integra

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