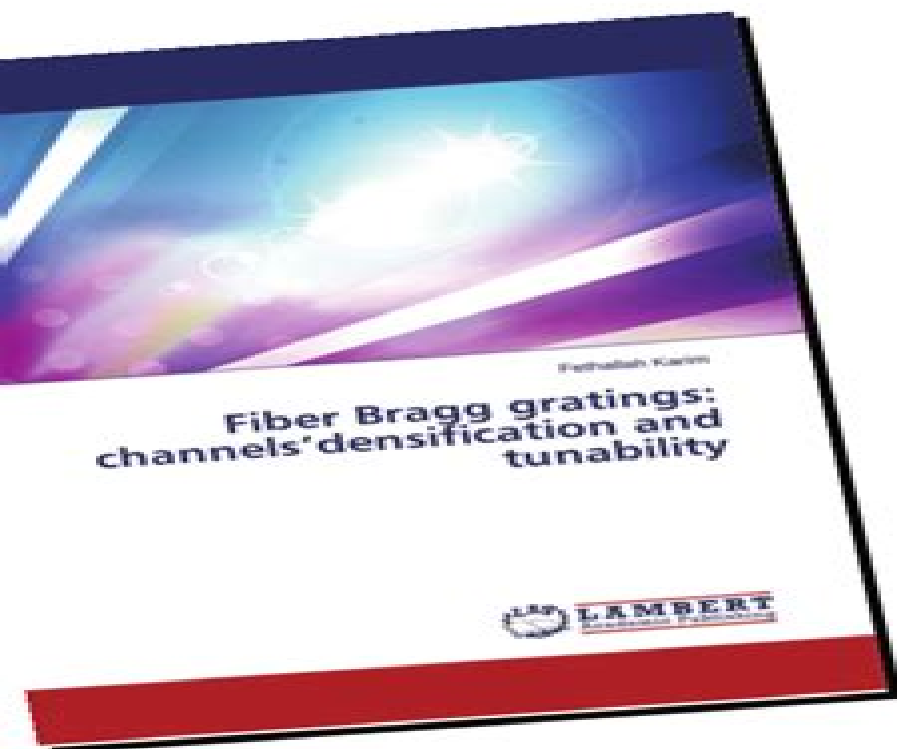




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## **Fiber Bragg gratings: channels' densification and tunability**

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This book gives an overview of Fiber Bragg gratings and specially on sampled gratings which are used in WDM transmission links. In this document, several methods for channels' densification are presented. We focus also on channels' tunability by applying strain and temperature effects. Finally, multiplexers and demultiplexers based on uniform Bragg gratings are presented and analyzed at the end of this manuscript.



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# Fiber Bragg Gratings Channelsdensification And Tunability

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## **Fiber Bragg Gratings Channels densification And Tunability:**

Fiber Bragg Gratings: Channels' densification and Tunability Fethallah Karim, 2014-03 This book gives an overview of Fiber Bragg gratings and specially on sampled gratings which are used in WDM transmission links In this document several methods for channel s densification are presented We focus also on channel s tunability by applying strain and temperature effects Finally multiplexeurs and demultiplexers based on uniform Bragg gratings are presented and analyzed at the end of this manuscript **Full Matlab Code for Synthesis and Optimization of Bragg Gratings** Fethallah Karim, 2018-11-07

This book presents a theoretical description of fiber Bragg gratings focusing on channels densification and the tunability of Bragg filters It also includes a full Matlab code for the synthesis and optimization of several kinds of fiber Bragg gratings by using the directed tabu search the simulated annealing method and the genetic algorithm Physical and optical parameters of uniform chirped and sampled fiber Bragg gratings are then reconstructed with these algorithms **Fiber Bragg Gratings**

Raman Kashyap, 2009-10-23 Provides an overview of Fiber Bragg Gratings FBGs from fundamentals to applications Evaluates the advantages and disadvantages of particular applications methods and techniques Contains new chapters on sensing femtosecond laser writing of FBGs and poling of glass and optical fibers Includes a special version of the photonic simulator PicWave tm allowing the reader to make live simulations of many of the example devices presented in the book This fully revised updated and expanded second edition covers the substantial advances in the manufacture and use of FBGs in the years since the publication of the pioneering first edition It presents a comprehensive treatise on FBGs and addresses issues such as the merits of one solution over another why particular fabrication methods are preferred and what advantages a user may gain from certain techniques Beginning with the principles of FBGs the book progresses to discuss photosensitization of optical fibers Bragg grating fabrication and theory properties of gratings specific applications sensing technology glass poling advances in femtosecond laser writing of Bragg gratings and FBG measurement techniques In addition to material on telecommunications usage of FBGs application areas such as fiber lasers and sensors are addressed in greater detail This special version of Picwave is limited to modelling only the passive fibre devices covered in this book However the full PicWave package is capable of modelling other non linear and active devices such as laser diodes and SOAs as discussed in Chapter 8 More information about PicWave can be found at [www.photond.com/products/picwave.htm](http://www.photond.com/products/picwave.htm) In addition to researchers scientists and graduate students this book will be of interest to industrial practitioners in the field of fabrication of fiber optic materials and devices Raman Kashyap Canada Research Chair holder on Future Photonics Systems and Professor at cole Polytechnique University of Montr al since 2003 has researched optical fibers and devices for over 30 years He pioneered the fabrication of FBGs and applications in telecommunications and photonics Provides an overview of Fiber Bragg Gratings FBGs from fundamentals to applications Evaluates the advantages and disadvantages of particular applications methods and techniques Contains new chapters on sensing femtosecond laser writing of FBGs and poling of

glass and optical fibers Includes a special version of the photonic simulator PicWave<sup>tm</sup> allowing the reader to make live simulations of many of the example devices presented in the book

**Fiber Bragg Gratings** Andreas Othonos, Κυριάκος Καλλή, 1999 Fiber Bragg gratings are flexible cost effective and highly efficient with a vast range of potential applications This timely new work provides a comprehensive description of the principles and practical applications of this latest technology which has the potential to revolutionize telecommunications and significantly impact optical fiber sensing Here the authors explain the underlying physics and practical aspects in a clear and unambiguous manner

**Analysis and Development of a Tunable Fiber Bragg Grating Filter Based on Axial Tension/compression**, 2005 Fiber Bragg gratings FBGs are key elements in modern telecommunication and sensing applications In optical communication with the advancement of the Erbium doped fiber amplifier EDFA there is a great demand for devices with wavelength tunability over the Erbium gain bandwidth in particular for wavelength division multiplexing WDM networks The center wavelength of a FBG can be shifted by means of change of temperature pressure or mechanical axial strain The axial strain approach is the best method among all other techniques because it allows relatively large wavelength shifts with high speed Axial strain of up to 4% will be required to cover the whole EDFA region more than 40 nm of central wavelength shift The formation of Bragg grating results in significant reduction in mechanical strength of optical fibers especially in tension As a result axial strain of only about 1% can be achieved by mechanical stretching of FBGs In order to achieve the remaining 3% strain compression of FBGs has to be applied In this thesis the design and analysis of a novel device for achieving central wavelength shift are presented In particular the device has achieved for a fiber with 12 mm FBG a shifting of 46 nm in compression and 10.5 nm in tension with a reflection power loss of less than 0.25 dB and a FWHM bandwidth variation of approximately 0.1 nm Both variations are well below the Bellcore standards requirement of 0.5 dB for peak reflectivity variation and 0.1 nm for bandwidth variation The device consists of two fixed and one guiding ferrules The difficulties associated with compressing the FBG were handled by carefully selecting tolerances and adjustment procedures The device allows both tension and compression of FBGs and the use of different FBG lengths and actuators The effects of glue deformation and bending of the FBG during compression were analyzed in detail Further using the piezoelectric transducer PZT actuator as a driver tuning sp

**Polymer Optical Fiber Bragg Gratings** Ricardo Oliveira, Lucia Maria Botas Bilro, Rogerio Nogueira, 2019-11-12 Polymer optical fibers POFs have been regarded as a viable alternative to silica fibers in a variety of sensing applications Fiber optic sensors offer key advantages over other sensing technologies which include immunity to electromagnetic interference compact lightweight multiplexing capability and higher sensitivity This book gives an overview of the polymer optical fiber Bragg grating POFBG technology over the last 20 years covering aspects related to the fiber Bragg grating fabrication and also sensing applications The book is split into five chapters and it is written in such a way that can provide a comprehensive and simple route to new users scientists and engineers working or wishing to work in

the field of POFBGs Describes the systems commonly employed for producing fiber Bragg gratings FBGs in silica fibers that can be used for the production of POFBGs Explores different laser sources for the inscription of POFBGs Explores the capability of using this technology at the visible and infrared region in different fiber types e g step index microstructured unclad highly birefringent and in fibers composed of different polymer materials such as PMMA doped PMMA PS and ZEONEX Reports the fabrication of different types of POF gratings such as uniform phase shifted tilted chirped and long period gratings Shows the opportunities of POFBGs for a variety of sensing applications The insight to the use of POFBGs provides a vision for the opportunities of this fiber optic technology

**Tunable Fiber Bragg Grating Using Evanescent Field Coupling** Jae-yoon Jeong,2001 In this work we present experimental results on tenability of fiber Bragg grating incorporating evanescent field coupling Evanescent field is the exponentially decaying part of an optical mode formed in a waveguide A section of fiber with a Bragg grating written in it is side polished until most of the cladding is removed The evanescent field is modified by applying different index matching oil and by placing a dielectric material on the polished area of the fiber A tunability as much as 5 nm was demonstrated as the applied index matching oil varied from  $n = 1.40$  to  $n = 1.45$  Polarization dependent behavior of the device was also measured and it was found out that the polarization component that is perpendicular to the polished surface experiences severe loss A prototype tunable grating device incorporating a MEMS structure is also discussed

*Polymer Optical Fiber Bragg Gratings Technology* Hisham Kadhum,2016-10-16

**Tunable Phase-shifted Fiber Bragg Gratings and Its Applications in the Microwave Region** ,2009

Tunable Fiber Bragg Grating Filters Alessandro Iocco,1999

**Fiber Bragg Gratings** Marcelo Martins Werneck,Regina Célia da Silva Barros Allil,Fábio Vieira Batista de Nazaré,2017 A history of FBG device development Fiber Bragg grating theory and models How to set up a fiber Bragg grating laboratory Inscribing fiber Bragg gratings in optical fibers Calibrating fiber Bragg gratings for temperature and strain Encapsulation and bonding Compensation of induced thermal effects Structural health monitoring with fiber Bragg gratings Temperature measurements Measurement of the coefficient of thermal expansion of materials Leandro Alves Gar o and Marceli Nunes Gon alves Measuring strain and displacement Voltage measurement Marceli Nunes Gon alves Interrogation techniques of fiber Bragg gratings Current measurements Gas measurements Bruno Cerqueira Rente Ribeiro

A Technology Assessment of Bragg Grating Fiber Optic Based Nondestructive Evaluation (NDE) H. Thomas Yolken,George A. Matzkanin,2001

An Optical Tunable Filter Using a Single Fiber Bragg Grating Siti Nafisah Md. Rashid,2008

**Development of Apodized Fiber Bragg Grating for Application in Tunable Fiber Laser and as a High Temperature Sensor** Seng Sean Chong,2012

Current Trends in Short- and Long-period Fiber Gratings Christian Cuadrado-Laborde,2013-05-15 In this book the reader will find a collection of chapters written by different experts around the world describing the current research trends in both short and long period fiber grating technology This work is mainly addressed to researchers already working in this area but it is also accessible to anyone with a scientific background who

desires to have an updated overview of the recent progress in this domain It will also be valuable to scientist and engineers who have become newly involved in this field Each chapter is self contained and can be read independently of the others This book intends to provide highlights of the current research in this area showing the recent advances in the field of fiber gratings

Current Trends in Short and Longperiod Fiber Gratings Edvin Falk,2016-04-01 A fiber Bragg grating FBG is a type of distributed Bragg reflector constructed in a short segment of optical fiber that reflects particular wavelengths of light and transmits all others This is achieved by creating a periodic variation in the refractive index of the fiber core which generates a wavelength specific dielectric mirror A fiber Bragg grating can therefore be used as an inline optical filter to block certain wavelengths or as a wavelength specific reflector Fiber Bragg gratings are created by inscribing or writing systematic periodic or aperiodic variation of refractive index into the core of a special type of optical fiber using an intense ultraviolet UV source such as a UV laser A long period fiber grating couples light from a guided mode into forward propagating cladding modes where it is lost due to absorption and scattering It is an optical fiber structure with the properties periodically varying along the fiber such that the conditions for the interaction of several copropagating modes are satisfied The period of such a structure is of the order of a fraction of a millimeter In contrast to the fiber Bragg gratings LPFGs couple copropagating modes with close propagation constants therefore the period of such a grating can considerably exceed the wavelength of radiation propagating in the fiber Because the period of an LPFG is much larger than the wavelength LPFGs are relatively simple to manufacture Since LPFGs couple copropagating modes their resonances can only be observed in transmission spectra Long period grating has a wide variety of applications including band rejection filters gain flattening filter and sensors Various gratings with complex structures have been designed gratings combining several LPFGs LPFGs with superstructures chirped gratings and gratings with apodization Various LPFG based devices have been developed filters sensors fiber dispersion compensators etc This book entitled Current Trends in Short and Long period Fiber Gratings emphasizes the current trends in both short and long period fiber grating technology This book intends to provide highlights of the current topics in this area showing the recent advances in the field of fiber gratings

Simulation of Dual Fibre Bragg Gratings as a Fabry-perot Tunable Filter Siti Nafisah Md. Rashid,2010      *Optical Fiber Bragg Gratings* David A. Brown,Quin Zhang,1995      *Micro-structured Fiber Bragg Gratings for Sensing and Communication Applications* Agostino Iadicicco (t.d.-),2005      *Fiber Bragg Gratings in Polymer Optical Fibers* Nico Gérard Harbach,2008

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