CHAPTER 55

TECHNOLOGY
APPLIED PHYSICS

Doctoral Theses

618. VARSHNEY (Anshu D)
Numerical and Analytical Studies of Photonic Crystals and Devices.
Supervisor : Prof. R. K. Sinha
Th 16583

Abstract

Studies the example of a highly lperiodic cladding structure (conventional photonic crystal fiber) surrounding a solid glass core of a photonic crystal fibre and describes the fundamental waveguiding properties e.g. cut off properties, high numerical aperture, inquisitive dispersion properities (e.g. (i) zero dispersion at any wavelength (ii) nearly zero flattened dispersion and (iii) high negative dispersion), spectral response of bend loss, splice loss between similar PCFs due to transverse and angular misalignment etc. by means of full vectorial effective index method over scalar effective index method. Moving towards a modified structure, the size of air holes near the core has been amended to realize more flattened dispersion using revised full vectorial effective index method. Also to study the Birefringent behavior of the elliptical core photonic crystal fiber, a combined approach, FVEIM with higher order Mathieu functions, has been proposed. Proposes the hybrid design of PCF in which not only cladding but also core consist air holes and yields the ultrahigh birefringent with ultra low confinement loss by means of finite element method. photonic crystal waveguide i.e. nonlinear wave propagation through photonic crystal fiber has been studied by full vectorial effective index model with modified core radius for different design parameters. Enhanced effects of Superprism is very useful for number of applications including new devices for Dense wavelength-division- multiplexed to integrated optical circuits for beam manipulation. Spectral separation and beam steering properties can be strongly controlled using single
Superprism device rather than the larger system composed of other devices.

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