

Chromatic dispersion compensation techniques and characterization of fiber Bragg grating for dispersion compensation

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Abstract Pulse spreading due to the dispersion causes the overlapping of the transmitted pulses at the receiver end known as inter symbol interference (ISI). The ISI thus limits transmission of high speed data. We are living in the age of bandwidth hungry and high speed applications, for which optical networks form the most important part because of its high bandwidth. In optical networks chromatic dispersion (CD) is one of the main obstacle in high speed transmission. Hence this CD is compensated by various approaches throughout the transmission system. A review of all the main approaches is presented in this paper. Characterization of fiber Bragg grating for dispersion compensation is done using the reflection spectrum and group delay response analysis.

Keywords Optical fiber communication \cdot Dispersion \cdot Dispersion management \cdot Fiber Bragg grating (FBG) \cdot Optical phase conjugation (OPC) \cdot Electronic dispersion compensation (EDC) \cdot Holey fibers

1 Introduction

With the exponential growth of information industry and broadband services all over the world, it is necessary to explore the different link structure and operations to meet the demands of bandwidth hunger applications (Fludger and Duthel 2007). Currently wavelength-division-multiplexed optical fiber communication system provides the highest bandwidth and speed of all the modern communication networks (Breuer et al. 2011; Effenberger et al. 2010). In general, the transmission loss, non-linear effects, and dispersion are three main problems in optical fiber communication system. Especially in the case of long-haul and ultra-long haul transmission systems, their effect is cumulative over the

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