Result Analysis of Conventional Single Mode Fibre with 600 km by Chirped Fibre Bragg Gratings Dispersion Compensation

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ABSTRACT

In optical communication system to compensate dispersion Fiber Bragg grating (FBG) is one among the applicable and vital parts. Here we tend to are calculative best quantity of parameters by simulating the model so observe the result of this element in information receiver. To tackle the non linear effects of transmission Fiber Bragg grating has been utilized with optisystem software system very length. The analysis supported the chromatic dispersion. During this analysis style system with fiber Bragg grating and while not fiber Bragg grating and really the length. The role of the communication is to transport the optical signal from transmitter to receiver while not distorting it. Most light wave communication systems use optical fibers because the communication because fibers will transmit light-weight with a relatively bit of power loss. Fiber loss is, of course, a vital style issue, because it determines directly the repeater spacing of a long-haul light wave system. Another vital style issue is fiber dispersion that results in broadening of individual pulses within the fiber.

Keywords

Chirped fibre Bragg grating, dispersion compensation, L-band, conventional single mode fibre

1. INTRODUCTION

The basic perform of optical fibre is to move a sign from one location to different location through communication system for ex. A computer, video device or phone with high reliability and accuracy. The most constituent of an optical fibre communication connection are information sources, optical transmitter, optical connectors, cabled optical fibers, optical amplifiers, passive or active optical devices and optical receivers. One among the most necessary parts in an optical fibre link is cabled fiber. In optical fibre communication the part speed or cluster speed of a wave depends on the frequency it's known as dispersion. In optical fibre due to dependence of cluster index to wavelength chromatic dispersion occurred.

Now a day's communication is major research section. We are work to transmit data in high distance without any noice so we are design different type of system. Optical fiber transmission systems are designed, analyzed and simulated to get long length of fiber. The performance of optical fiber on optical signals is characterized by chromatic dispersion, background loss, polarization mode dispersion (PMD) and nonlinearity. Through an optical fiber, transmit information from one place to another by transmitting light pulses; this method is called fiber-optic communication. Electromagnetic carrier wave is modulated to carry information. In the 1970s first developed, fiber-optic communication systems have changed the telecommunications industry and have played an important role in the advent of the Information Age. Chromatic dispersion and polar mode dispersion occurs in single mode fiber (SMF). In optical system dispersion can be compensated by also using erbium doped fiber amplifier (EDFA). [2] Chromatic dispersion broadening the pulse of optical fiber and causes inter symbol interference (ISI). A preferable solution is that we can use Dispersion compensating fibers and they can provide broadband dispersion compensation. But there are numerous drawbacks of using dispersion compensating fiber, such as high nonlinearity and high insertion loss.

Optical fiber advancement dates back to 1790's once the French Chappe brothers invented the first "optical telegraph." that comprised of a series of lights mounted on towers where operators would relay a message from one tower to the next? In later centuries nice strides were created in optical science. However the very set up of using glass to transmit information signal among the type of light over long distance was developed by KAO and HOCKMAN in 1966.[2]

Optical communication systems use high carrier frequencies (100 THz) inside the visible or near-infrared region of the electromagnetic spectrum. They are typically called light-weight wave systems to distinguish them from microwave systems, whose carrier frequency is usually smaller by five orders of magnitude (1 GHz). Fiber-optic communication systems are light-weight wave systems of transmission information from one place to a unique by causation pulses of light through optical fiber. Such systems are deployed worldwide since 1980 and have thus revolutionized the technology behind telecommunications. Indeed, the light wave technology, alongside microelectronics, is believed to be a heavy considers the arrival of the "information age."

2. FIBER BRAGG GRATING

The FBG may be a kind of common single mode fiber that's sort of a grating. The Bragg conditions satisfied propagated light-weight, in a very FBG core is resonated by grating structure and reflected wave. The gratings distance specifies the mirrored wavelength, so that, from transmission spectra reflected light is removed in Bragg wavelength. A fiber bragg grating (FBG) may be a kind of distributed Bragg reflector created in a very short segment of optical fiber that reflects specific wavelengths of light and transmits all others. This can be achieved by making a periodic variation within the refractive index of the fiber core that generates a wavelength specific insulator mirror. A fiber Bragg grating will so be used as an inline optical filter to block certain wavelengths, or as a wavelength-specific reflector.

The first in-fiber Bragg grating was confirmed by Ken Hill in 1978.firstly, the gratings were fabricated using a visible laser propagating along the fiber core. In 1989, Gerald Meltz and colleagues demonstrated the much more flexible transverse holographic inscription technique where the laser illumination came from the side of the fiber.

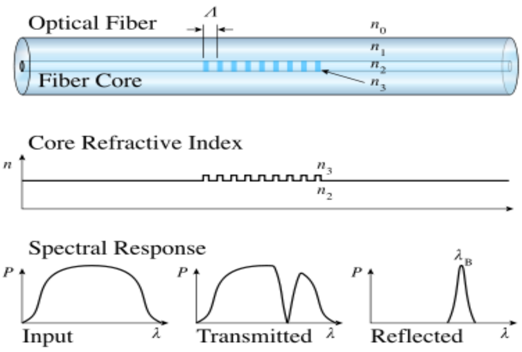

Fig.1 FBG

This instrument performs some operations like reflection and filtering with high efficiency and low loses. Some variations are created in amount of gratings (as result variations on the grating in a very chirp FBG. there's a delay occurred in wavelength with different time intervals, on the axis the period of grating changes, different wavelengths are reflected by different components of grating. in a very communication link chromatic dispersion may be compensated and compression in incident pulse occurred finally. most important reason to use chirp FBGs than all different advised sorts, are price efficiency and low internal lose nonlinear effects (Isa and Ahmet, 2005).

3. PROPOSED METHOD

3.1 Transmission system Use FBG

The transmission system model includes a user clear bit sequence generator, return-zero (RZ), a continuous wave (CW) laser with frequency 193.1 and output power 1MW and an AM modulator.

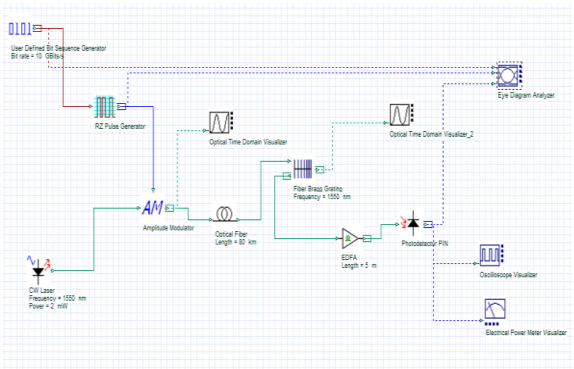

Fig.2 Transmission system use of FBG

The modulation of signal done with a return-zero user defined sequence in AM modulator. The output of system1 is fed into optical fiber whose length is 80km, dispersion is 16.75ps/km/nm, dispersion slope is 0.050pm/nm2/km, and attenuation index is 0.20km. Now to get a better result or to achieve a better signal the dispersed wave goes into the chirp fiber Bragg grating. The parameters occupied in chirp FBG are frequency, effective refractive index, length of grating, apodization function, tanh parameter, chirp function. Linear parameter and their values are 193.1THz, 1.45, 6, Tanh, 5, linear and 0.0001 respectively. The amplification of signal done through EDFA amplifier which has a gain amount of 6dB. The receiver side consists of a photo detector (PIN) and eye diagram analyzer.

3.2 Optisystem simulator

Optisystem is software system for the testing, improvement and style of any form of optical link within the physical layer of the broad spectrum of optical networks, to local area networks (LANs) and metropolitan area networks (MANs) from end of the day systems. Optisystem is complete optical communication system simulation package. In fiber optic communication systems system level simulator relies on the realistic modeling of it, a very hierarchical definition of parts and new simulation surroundings and systems.[1]

OptiSystem is an optical communication system simulation pack up for the preparation testing, and optimization of just about any kind of optical link within the physical layer of a big spectrum of optical networks, from analog video broadcasting systems to international backbones. A system level simulator supported the realistic modeling of fiber-optic communication systems, OptiSystem possesses a strong simulation surroundings and a very hierarchical definition of parts and systems. Its capabilities will be simply expanded with the addition of user parts and seamless interfaces to a variety of widely used tools. OptiSystem is compatible with Optiwave's OptiAmplifier and OptiBPM style tools.

OptiSystem is a modern, speedily developing, and powerful software system style tool that allows users to set up, test, and simulate nearly each variety of optical link within the transmission layer of a big spectrum of optical networks from local area network, SAN, MAN to ultra-long-haul. It offers transmission layer optical communication system style and designing from part to system level, and visually presents analysis and situations. Its integration with different Optiwave products and style tools of trade leading electronic design automation code all contribute to OptiSystem speeding your product to promote and reducing the payback amount.

4. SIMULATION RESULTS

Simulation of transmission system is done by using Chirped Fiber Bragg grating for compensation of dispersion. 10 Gbps data is transmitted for long distance of 70 km. The behaviour of the system is defined by Q-factor and bit error rate (BER).By the proposed system the length is increased from 10 km to 70 km along with the increase in the q-factor from 20.0024 to 20.8985 and BER is reduced from 2.61793e-089 to 1.65689e-097.

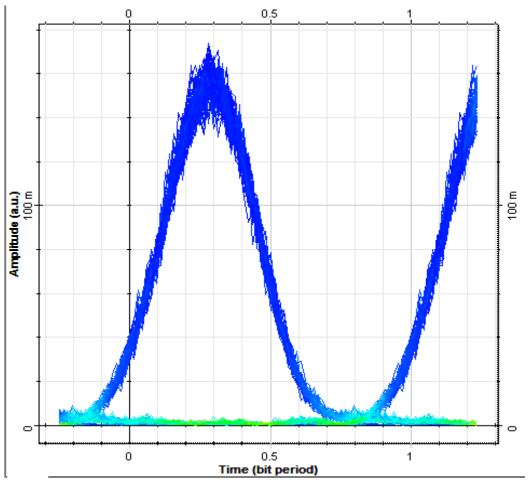

Fig.3 Eye Analyzer of fiber length is 70km

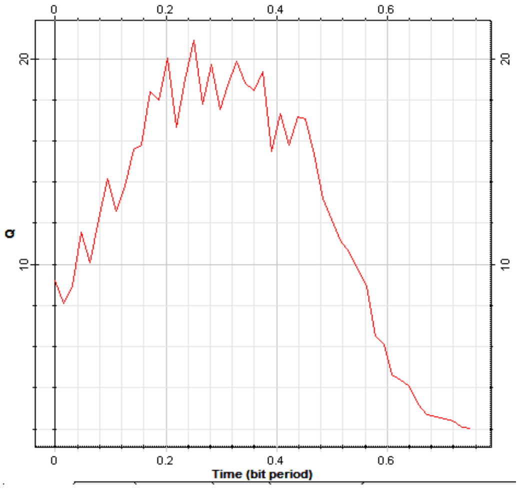

Fig.4 BER Analyzer of fiber length is 70km

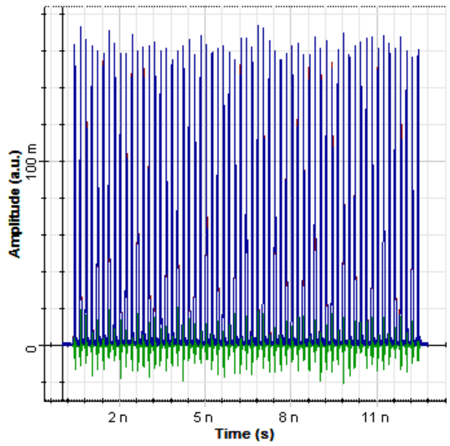

Fig.5 Oscilloscope Visualizer of fiber length is 70km

5. CONCLUSION

Above propose in information transmission communication system is simulated. To get better result chromatic dispersion should be compensated in optical fiber. We increase the length of fiber to transmit the signal to long length with less dispersion. The length we gained is 70 km which is better for the system than the other.

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