Advance Approach For Long Range Data Transmission Using Optical Fiber Communication

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Abstract: In modern days optical fiber communications is using widely. This is very efficient compare to other wire and wireless communication. The information is transmitted with speed of light but there are few limitations. The original signal which is converted into light signal is distorted, attenuated, dispersed and absorbed by the impurities of material. In this paper we focus on Kerr non-linear effect in self phase and cross phase modulation using to improve signal to noise ratio (SNR).

***IndexTerms*–Kerr Effect, Self-Phase Modulation, Cross Phase Modulation**

I. INTRODUCTION

Wired correspondence will be correspondence advancement where information communicated over a wired for instance turned pairs in lower and higher repeat and optical fibers in higher and ultra-high recurrence in like manner telephone frameworks, TV, web Access and correspondence. The transmission of higher-trade speed information over optical fibers is crippled by an assortment of straight and nonlinear impacts in perspective on the essential properties of the transmission medium. The transmission of higher information rate developments over long divisions is constrained by a few fiber properties that show together to turn the optical signal. Chromatic dispersion (CD) distort the relative stage data of the banner and prompts common mutilation of the bit model. The non-direct Kerr sway impels self-phase modulation (SPM), cross-phase modulation (XPM) and four-wave mixing (FWM) between different channels of a WDM structure. Stimulated Brillouin Scattering (SBS) uproariously scatters some segment of the banner control, Stimulated Raman Scattering (SRS) trades control from channels toward one side of the banner range to various channel [11].

II. Nonlinear of Fibers

In an optical fiber, light is bound to a little transverse locale, so that even moderate optical forces lead to high optical powers. What's more, light frequently propagates over significant separations in a fiber. Therefore, nonlinear impacts because of fiber nonlinearities regularly have significant impacts. This is especially the situation if filaments are utilized to transmit short heartbeats, and in fiber speakers for short pulses [13].

- **The Kerr Nonlinearity**

The Kerr impact is a nonlinear optical effect happening when genuine light engenders in valuable stones and glasses, yet likewise in other media, for instance, gases. Its physical beginning stage is a nonlinear polarization made in the medium, which itself changes the expansion properties of the light. The Kerr sway is the effect of a speedily happening nonlinear response, which can be depicted as changing the refractive rundown [13]. In particular, the refractive rundown for the high beams light bar itself is changed by

$$\Delta n = n_2 l$$

The nonlinear file n2 and optical quality I.

- **Self-phase Modulation**

One of the Kerr sway is self-stage adjustment (SPM). This suggests a light waves in the fiber experience a nonlinear stage concede which outcomes from its own capacity [13].
For a fiber method, the stage transformation per unit optical power and unit distance is portrayed by the proportionality enduring

$$\gamma_{SPM} = \frac{2\pi n_2}{\lambda A_{eff}}$$

(in units of rad/(W · m)) where A_{eff} is the practical mode domain. Strikingly, for a practically Gaussian mode shape with shaft run w this regard is only a huge part of the impetus for a Gaussian column in a homogeneous medium, where only the on-center point regard is considered. In the fiber, we have lower arranged changes from the fiber rotate, and the for the most part nonlinear stage delay is only a substantial bit of the apex regard. (Note that the wave fronts of a mode in the fiber are kept generally plane regardless of SPM; the mode is "kept together" by the balance of diffraction and waveguiding, and the nonlinear stage change is "spread" over the whole shaft profile) [13].

- **Cross Phase Modulation**

Cross-phase balance is the alteration in the optical time of a light bar realized by the coordinated effort with other bar in a nonlinear medium, unequivocally a Kerr medium. This can be depicted as alteration in the refractive file:

$$\Delta n^{(2)} = 2n_2 l^{(1)}$$

where n_2 is the nonlinear list. Now, the force $l^{(1)}$ of shaft 1 causes a refractive record alteration for bar 2 [13].
Differentiated and the relating condition for self-stage change, there is another factor of 2. These factor 2 are considerable for bars with a comparable polarization; for cross-delighted shafts in isotropic media (for instance glasses), it must be superseded with 2/3.

A continuously significant delineation of cross-stage tweak impacts implies the nonlinear polarization cause in the medium, in light of the $\chi^{(3)}$ nonlinearity. For instance, the recently referenced factors 2 can be understood on that premise [13].

## III. EXPERIMENT RESULTS

Step 1: For input signal.
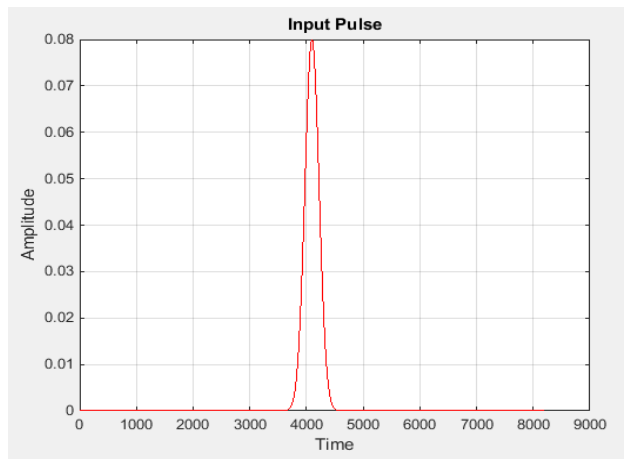
Step 2: Cross Phase Modulation: It is a nonlinear optical impact where one wavelength of light can influence the period of another wavelength of light through the optical Kerr impact. At the point when the optical power from a wavelength impacts the refractive list.We have used for distance, time and amplitude in pulse evolution.
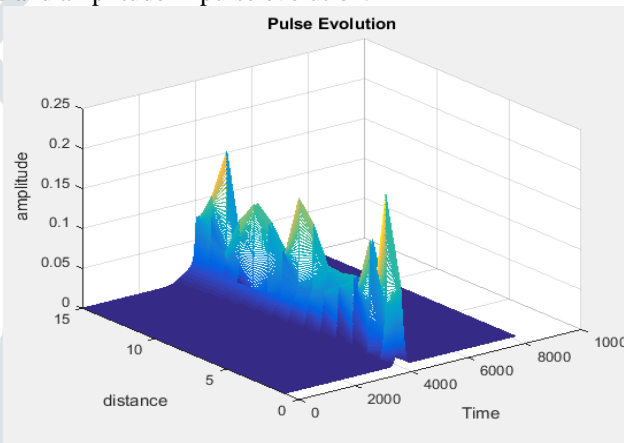

Step 3: Pulse broadening Ratio: It is spreading of the light pulses as they travel down the fiber.
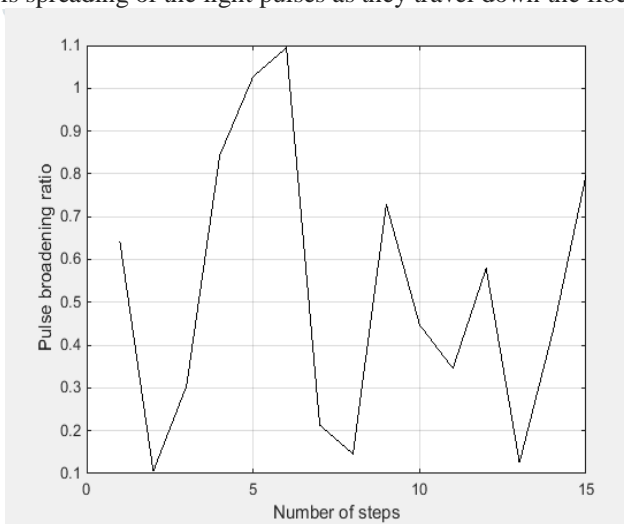
Step 4: Pulse changing with distance
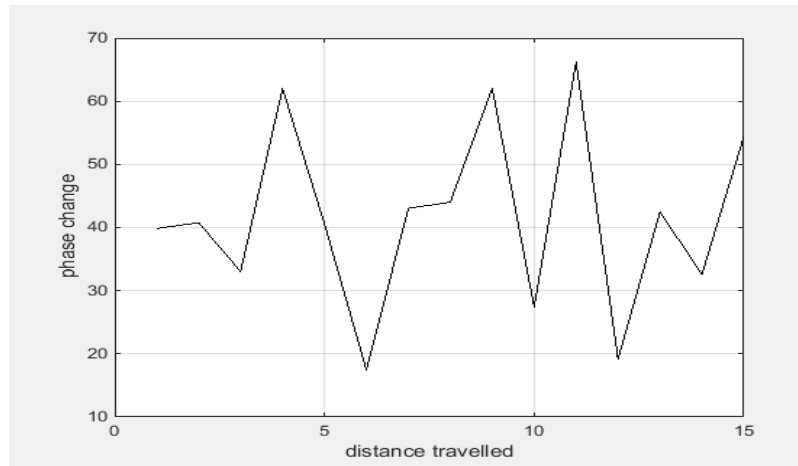
Step 5: Bit error Rate:It is the quantity of bit blunders is the quantity of gotten bits of an information stream over a correspondence channel that have been changed because of commotion, impedance, mutilation or bit synchronization error.
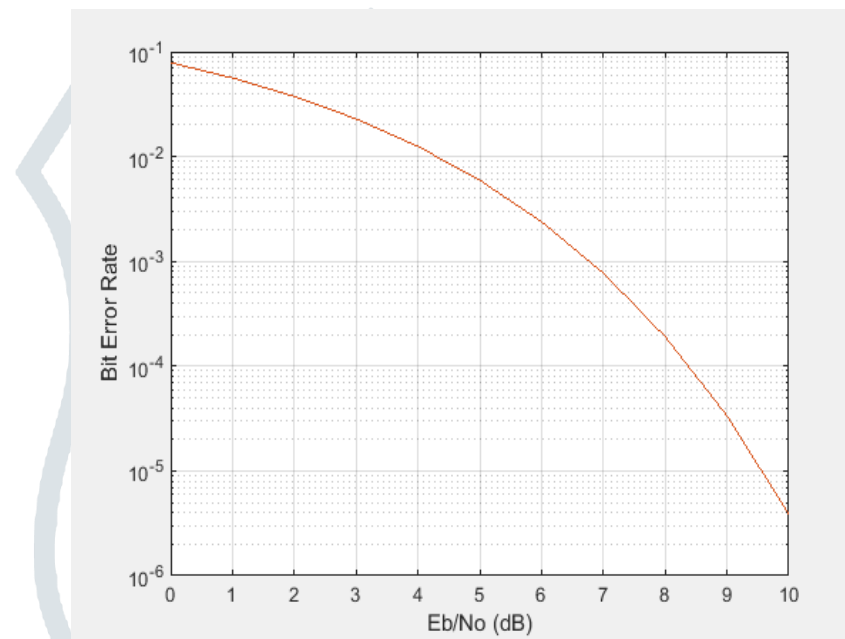
IV.CONCLUSION

optical fiber communications system use widely in current generation. So in these paper design advance approach for effectively transmission of data on long distance.In these paper successfully implement single phase and cross phase modulation technique with high data rate transmission. And also work on BER AND SNR parameters. And as result prove that proposed approach gives better result as compared to existing system.in future work on other modulation technique.

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