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## Fiber Optics Communication

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**ABSTRACT:** Optical Fiber used for communication purpose, optical fiber is fast communication method mostly use communication methods. It is a flexible Fiber, also it is transparent Fiber made up of drawing glass or Plastic to a diameter slightly thicker than that of a human hair. Size of the optical Fiber is very thin due to which it can be installed in a small place also, but one drawback is that it required high maintenance cost, once optical Fiber got damaged then chances of recovery is very less, In this paper there is discussion of optical Fiber and its applications at various places, there is different kind of optical Fiber present in the market due to which application of different Fiber is at different places. Optical Fiber is of various types single mode, multimode and plastic optical Fiber. In this paper discussed The Fiber Signal Interferometer. In this paper also there is change in methodology and design of Fiber Signal Interferometer. In this paper explained the reciprocity of the optical Fiber, and explained the conditions of reciprocity in optical Fiber, optical Fiber consist of two metallic layer in between that electromagnetic energy traveled and the speed of light which is traveled from the Fiber optics had a loss figure network. The applications range from the expected gyroscopes into the novel Hydrophone arrays and intruder detection systems. Immediately its potential for gyroscopic measurements became apparent, and since the first demonstration, substantial research and development investment has evolved a diversity of rotation measuring instruments. In this paper current progress and work in the field of optical Fiber has been discussed recent progress on optical fiber industry, examine the optical communication system has been reviewed along with current optical Fiber monitoring and diagnosing problems in limited access, also optical Fiber used in various places such as communication systems, in mobile phones and in submarine communication systems. Scope of Optical Fiber and its application in future has been discussed in this paper.

**KEYWORDS:** Optical Fiber, Communication, Electromagnetic, Reciprocity, Interferometer, Gyroscopic, Diagnosing.

### I. INTRODUCTION

Optical Fiber used for various places and various application, it is fastest communication technology, in fig 1 shows the process of optical transmitter module in which when electrical signal is pass through transmitter module (consist of drive circuit, light source and Fiberflyleaf all these connected with Fiber connector and the resulted signal passes through the optical Fiber and pass into the optical splice again the resulted output optical signal is pass through optical coupler and beam splitter and then resultant optical signal which was earlier an electrical signal is pass into the equipment[1], also a parallel process operated within the optical Fiber which is regenerator module consist of optical receiver, optical transmitter and electronics and from the regenerator module optical signal pass into the optical amplifier and then signal pass into the optical receiver module and that module consist of Fiberfly head, photo detector, amplifier, and again that optical signal is converted into electrical signal from the device named signal restorer and electrical comes out of the process[2].

What are scattering losses of an optical Fiber?

Other than the useful and protective manufacturing methods, Fiber is of two types homogeneous and non-homogeneous Fiber but among all the Fibers mostly are inhomogeneous which is disordered and amorphous structure. It is seen that high order modes of optical Fiber suffer more losses and which in results cause modal dispersions[3].

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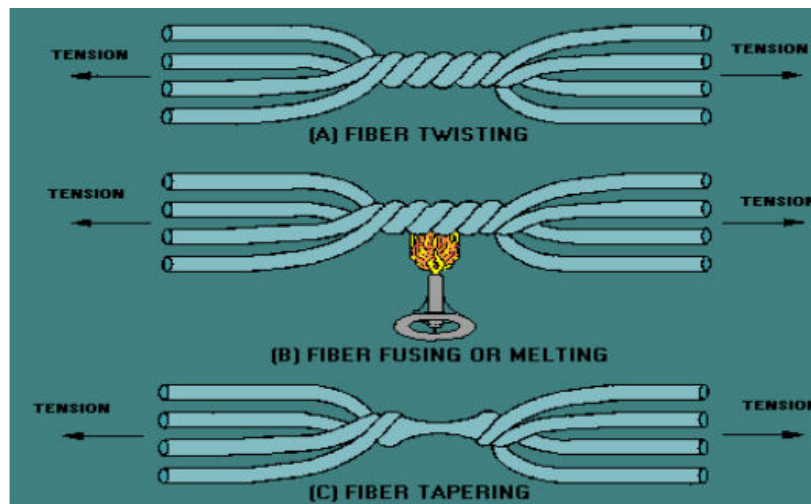


Figure 1 : Types of Fiber

The modal dispersion is one of the primary causes of rising time degradation for increasing fiber wavelengths. Vibration or propagating time of optical Fiber kept on changing with an index of refraction power loss due to scattering are caused by such imperfections in the core material and there is some difference in size known as irregularities of optical Fiber between the junction and cladding. In homogeneities can be either structural or compositional in nature. In structural in homogeneities, the basic molecular structure has random components, whereas, in compositional inhomogeneity, the chemical composition of the material varies. The net effect from either inhomogeneity is a fluctuation in the refractive index[3-5]

## II. LITERATURE REVIEW

There has been many papers published in the field of optical Fiber and optical Fiber comes in use at various places such as in communication system, in submarine, mobile network etc., among all the papers one research paper titled Recent Research and Development of Optical Fiber Monitoring in Communication Systems by Kunihiro TOGE and Fumihiko ITO discussed about the Optical fiber monitoring in current optical fiber cable networks, discuss about the Access network, discussed trunk network and submarine network. In this paper also discussed the Recent research on optical fiber monitoring in communication systems such as End-reflection assisted Brillouin analysis for PON branch monitoring. In this there are various cases such as Issues with current monitoring in access networks, End-reflection assisted Brillouin analysis.

Optical Fiber works on the principle of Principle of end-reflection assisted Brillouin analysis and graphical representation of Example of measured loss distribution in eight of the 32 branches (the measured wavelength was  $1.55\mu\text{m}$ ), discussed about the Long-range C-OFDR for identifying high-PMD section along installed cables, explained different types of issue created with different trunk network, also Schematic configuration and principle of PNC-OFDR has been discussed in this paper, mathematical representation of the optical Fiber and its communication process. Frequency division multiplexing coherent OTDR for submarine cable monitoring has been discussed and also explains the issues with construction and maintenance of submarine optical fiber cables, Two examples of distributed linear birefringence measurement (the insets show the p-polarization reflectivity of the PNC-OFDR in the high-birefringence section), also explained the High sensitivity measurement by FDM-OTDR, graphical representation of OTDR traces obtained by FDM-OTDR and conventional C-OTDR. This paper covers the application and types of optical Fiber used at various places[6].

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In a research paper titled Modern Optical Fiber – Communication Splitter Transmitter Module by Dwaipayan Biswas discussed the motivation – optical confinement, also explains aims and scope of the journal, explains why optical Fiber is necessary and what's its replacement and enhancement in industrial field, what is Polarized Light on Fiber Optics and different components of Fiber optics also been discussed in this paper components such as polarized light, polarizing filter, optically active solution, angle of rotation of plane of polarization all these component and its process has been discussed in this paper [7-10]. In this paper there is an explanation of the aim and scope of optical Fiber has been discussed. In this paper also explained what is Fiber optimization, there has been many types of optical Fiber loss such as attenuation, scattering, macroscopic bends, intermodal dispersion and material dispersion, has been discussed in this paper, and cause of all losses and their remedy, application of Fiber optics such as mie-scattering, rayleigh scattering with diagram has been discussed in this paper. Mie Scattering defines as Non-perfect cylindrical structure of the fiber and imperfections like irregularities in the core-cladding interface, diameter fluctuations, strains, and bubbles may create linear scattering which is termed as Mie scattering, Rayleigh Scattering The dominant reason behind Rayleigh scattering is refractive index fluctuations due to density and compositional variation in the core. It is the major intrinsic loss mechanism in the low impedance window. Rayleigh scattering can be reduced to a large extent by using the longest possible wavelength. Optical Fiber work on different frequencies and that has been discussed in this paper, synthesis of optical Fiber has been discussed in this paper also attenuation in transmission lines has been discussed.

## III. CONCLUSION

In this paper current and upcoming research and development with respect to optical Fiber has been monitored and discussed. The optical reflectometry is a promising technology that enables operators to maintain a large number of facilities. In optical Fiber monitoring in communication there are two main technologies available which are OTDR or C-OTDR used in optical Fiber monitoring. However, the diagnosing problems in communication systems will become more multifaceted as the systems progress and will require different functions related to optical access, trunk and submarine configurations and applications. Further research and development of optical fiber monitoring technologies are expected with a view to realizing highly reliable optical services. In this paper discuss the basic behavior of mechanics of cable behavior, and this study is derived with respect to mechanical tension applied to the cable, in cable different methods applying in different situations on cables. Matched line loss in optical Fiber is the power lost in a matched line. Matched line loss is also expressed in decibel per 100 feet. For optical Fiber it is important to fix the frequency of optical Fiber because of which loss develops, we know that loss of the transmission line increases with increase in frequency.

Conductor and dielectric losses increase with frequency, but not in the same way. The relative amount of each type of loss depends also on the construction on the line, so there is no specific relationship between loss and frequency valid for all types of lines. In this paper different types of optical Fiber have been discussed and loss mode resonance in optical Fiber and RG discussed in this paper with the result at different values of frequency, at different values of frequency value of LMR and RG has been discussed and gives the result of those losses and resonance. Optical Fiber has sometimes non-linear behavior, optical Fiber power levels scattering because disproportionate attenuation, Because of this nonlinear scattering, the optical power from one mode is transferred in either the forward or backward direction to the same, or other modes, at different frequencies.

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