

Abstract

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Receiver optimization of FSO system with MIMO technique over log-normal channels

A major performance degrading factor in free space optical (FSO) communication systems is the atmospheric turbulence. Multiple input multiple output (MIMO) technique provides a promising approach to mitigate turbulence-induced fading. In this paper, MIMO technique with equal gain combining (EGC) is considered to enhance the data rate of the FSO communication system. Atmospheric turbulence impact is modeled as a log-normal channel and geometric losses are taken into account. Using non return to zero (NRZ) line code, FSO highly sensitive receiver using avalanche photodetector (APD) and PIN are designed and simulated for best system performance. The comparison is carried out with Bessel filter and Gaussian filters. We found that, the APD receiver using Gaussian filter is suitable for long range link with APD gain value of 3. Also, the Selection of APD gain is critical to the system performance. The optimal value of APD gain required for best system performance decreases by increasing the size of MIMO.