

Abstract

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Probability of error performance of free space optical systems in severe atmospheric turbulence channels

Atmospheric turbulence causes degradation in the performance of the freespace optical (FSO) transmission. This turbulence is referred to as scintillation. To mitigate this effect, a multiple input multiple output (MIMO) system is employed. This paper investigates the use of multiple lasers and multiple aperture receivers in severe atmospheric turbulence when binary pulse position modulation (BPPM) is employed. First, single input multiple output (SIMO) system using BPPM technique is investigated with equal gain combining (EGC), selection combining (SC), and maximal ratio combining (MRC) diversity schemes. A closed form for the probability of error has been derived for both SC and MRC techniques, as well as Monte Carlo simulations. Then, a MIMO system for both zero forcing (ZF) equalizer and minimum mean square error (MMSE) equalizer is used. Finally, a comparison between different diversity techniques and linear equalizers is carried out.