

Abstract

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Free Space Optical Communications System Performance under Atmospheric Scattering and Turbulence for 850 nm-1550 nm Operation

In this work, a free space optical communication (FSO) link is proposed and utilized to explore and evaluate the FSO link performance under the joint occurrence of the atmospheric scattering and turbulence phenomena for 850 and 1550 nm operation. Diffraction and non-diffraction-limited systems are presented and evaluated for both wavelengths' operation, considering far-field conditions under different link distances. Bit error rate, pointing error angles, beam divergence angles, and link distance are the main performance indicators that are used to evaluate and compare the link performance under different system configurations and atmospheric phenomena combinations. A detailed study is performed to provide the merits of this work. For both far-field diffraction-limited and non-diffraction-limited systems, it is concluded that 1550 nm system operation is better than 850 nm for the whole presented joint occurrences of atmospheric scattering and turbulence.