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Characterization of Signal Fluctuations in Optical Communications with Intensity Modulation and Direct Detection through the Turbulent Atmospheric Channel

By Nicolas Perlot

Shaker Verlag Feb 2006, 2006. Taschenbuch. Condition: Neu. Neuware - Laser free-space communications are now able to compete with radio communications. However, optical communications through the atmosphere still suffer from significant drawbacks. In particular, atmospheric optical turbulence, which consists of variations of the refractive index, must be considered as random. Turbulence induces phase and intensity fluctuations in the propagating wave and can cause severe degradations of the system performance. The purpose of this thesis has been to characterize the turbulence-induced fluctuations of the received optical power, also called scintillation. These fluctuations depend on parameters such as the path length, the turbulence strength, the beam shape or the size of the receiving aperture. Theoretical results are derived from the Kolmogorov model of turbulence but different approaches leading to different results are available. Distribution and temporal spectrum of the received optical power serve as inputs to the direct-detection receiver model. 177 pp. Englisch.



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