

本期目录 | 下期目录 | 过刊浏览 | 高级检索
页] [关闭]

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光通信

对数正态分布下的无线光通信系统误码率分析

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摘要: 对开关键控(OOK)强度调制直接检测(IM/DD)方式的无线光通信接收发射系统的光电信号进行分析, 并使用最大后验概率(MAP)方法确定判决阈值。将对数正态分布作为湍流信道上光强闪烁模型, 建立了系统误码率与湍流强度、光源相干参数、激光发射器光功率等系统参数之间的定量关系。采用部分相干光作为信号光能降低光源相干度, 有效抑制湍流效应。计算结果表明: 在一定条件下, 湍流强度改变0.5个量级系统误码率相差6-8个量级, 并且最优源相干参数可以通过计算得到, 其对应的部分相干光最有利于提高通信系统性能。

关键词: 大气光学 无线光通信 阈值判决 对数正态分布 部分相干光 误码率

Analysis on bit error rate of wireless optical communication system under lognormal distribution

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Abstract: The photoelectric signals of wireless optical communication transmit-receive system which used the intensity modulation direct detection (IM/DD) and on-off keying (OOK) were analyzed. Maximum a posteriori probability (MAP) method was performed to confirm the decision threshold. By employing lognormal distribution as the scintillation model in turbulence channel, the quantity relationship between system bit error rate (BER) and system factors such as turbulence intensity, source coherence parameter, optical power of laser transmitter, etc. was established. Adopting partially coherent beam as signal source laser diminished the coherence of signal source laser and thus retrained the turbulence effect availably. The calculated results indicate that the behavior of system BER transforms 6 to 8 orders as turbulence intensity changes with a half order under some certain condition. Partially coherent beam with optimum coherence parameter, which can be acquired through computation, is most favorable of enhancing the communication system performance.

Keywords: atmospheric optics wireless optical communication threshold decision lognormal distribution partially coherent beam bit error rate

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