

理论研究

## 大气闪烁对无线光CDMA通信系统性能的影响

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**摘要** 将光CDMA技术应用到无线光通信中。提出了基于脉冲位置调制的二维大气无线光CDMA通信系统,并分析了该通信系统的性能。考虑多用户干扰、APD噪声以及热噪声等干扰因素的影响,采用数值分析的方法,详细分析了大气湍流引起的大气闪烁对二维无线光CDMA通信系统误码率的影响。结果表明,大气闪烁是影响二维无线光CDMA系统误码率性能的一个重要因素;当大气闪烁的对数方差较小(如 $\sigma_{2s}=0.1$ )时,该系统可以实现高速率通信;当大气闪烁的对数方差较大( $\sigma_{2s}\geq 0.2$ )时,在有限的光功率条件下,该系统难以实现通信,需要采用信道编码技术来提高系统的误码率性能。

**关键词** [无线光通信](#) [光码分多址](#) [大气闪烁](#) [脉冲脉位调制](#)

分类号

## Influence of atmospheric scintillation on performance of wireless optical CDMA system

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**Abstract** Two dimensional atmosphere wireless optical CDMA communication system with M-ary PPM(pulse position modulation) signal format is presented and studied. With the factors of multi-user interference, avalanche photodiode (APD) noise and thermal noise taken into account, the influence of atmospheric scintillation on the bit error rate(BER) of two dimensional wireless optical CDMA communication system was analyzed in detail. The results indicate that the atmospheric scintillation is an important factor for the bit error rate of two dimensional wireless optical CDMA systems. High speed communication can be realized in wireless optical CDMA systems if the logarithm variance of the scintillation is small enough (for example,  $\sigma_{2s}=0.1$ ). Otherwise, if the logarithm variance is too big( $\sigma_{2s}\geq 0.2$ ), it will be difficult to communicate with limited receiving power. In this case, some improving methods, such as channel coding technology, need to be used to improve the BER performance of 2D optical CDMA communication system.

**Key words** [wireless optical communication](#) [optical CDMA](#) [atmospheric scintillation](#) [pulse position modulation](#)

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