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光通信与光信息技术

光束发散角对紫外LED散射通信接收能量的影响

何宁, 郭求实, 何志毅

桂林电子科技大学 信息与通信学院, 桂林 541004

摘要： 为了更准确地研究紫外光的通信性能，针对紫外LED散射光通信中光能量传输特征，以及光束发散角对散射链路构成与接收光子能量有一定影响，采用多个LED组成阵列发射的方法，扩大光束与散射体的作用效应，分析了光束发散角对不同散射体作用时光子能量的变化关系，研究了紫外光散射通信脉冲调制方法与提高发射功率措施，提出了脉冲位置调制驱动阵列LED的解决方案，并进行了紫外LED散射通信系统室外传输测试。结果表明，在短距离通信中，大的散射角使得光对散射体的作用区域增大，散射效应明显，到达光接收端的光子数量增加；实际通信应用中，散射光通信具有较高的灵活性和实时性，可适当进行光学处理来优化光路结构。此结果为进一步增加传输距离和传输效果提供了正确的指导。

关键词： 光通信 散射通信 光发射阵列 光束发散角 脉冲位置调制 接收能量

Effect of the beam divergence angle on receiving energy of UV-LED scattering communication

HE Ning, GUO Qiushi, HE Zhiyi

School of Information and Communication, Guilin University of Electronic Technology, Guilin 541004, China

Abstract: According to transmission characteristics of optical energy in ultraviolet light-emitting diode (LED) scattering communication, the beam divergence angle has a certain influence on scattering link structure and received photon energy. The action effect of the beam and scatterers was strengthened with the transmit array composed by a plurality of LEDs. With the effects of different scattering on the beam divergence angle, the changing of the photon energy was analyzed. In order to study the UV communication performance more accurately, pulse modulation method and measures to increase the transmission power of UV scattering communication were studied, the solution of LED array driving circuit and the pulse position modulation (PPM) were given, scattering communication system transmission of UV-LED was tested outdoor. The experimental results showed that, in the short distance communication, large scattering angle made the light area of scatterers increase and more effective of scattering, the amount of photons arriving at receiving was increased. In the actual communication applications, the scattering optical communication was higher flexibility and real-time, appropriate optical processing can be used to optimize the structure of the optical path for increasing the transmission distance. The result provides a correct guidance for larger transmission distance and better transmission effect.

Keywords: optical communication scatter communication light emitter array beam divergence angle pulse position modulation received energy

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通讯作者:

作者简介: 何 宁（1958- ），男，研究员，主要从事光通信和光电探测方面的工作。E-mail：ofca@163.com

作者Email:

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