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# 并行翻转-正交频分复用调光控制室内可见光通信系统

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# PF-OFDM dimming control for indoor visible light communication systems

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**摘要**

由于室内可见光通信系统不仅需要高速可靠的数据传输链路还需要高质量的照明条件,本文基于脉冲宽度调制(PWM)调光控制技术及可见光频分复用(OFDM)系统工作原理,对并行翻转(Parallel Flip)-OFDM(PF-OFDM)室内可见光高速通信系统的调光控制进行了研究。介绍了PF-OFDM的原理,验证了其功率效率、频谱利用率、误码性能的良好折中能力。然后将其应用到调光控制中,对其调光性能进行了分析比较。实验结果表明,在16QAM调制下,PF-OFDM室内可见光通信系统的调光控制在达到直流偏置光-OFDM(DCO-OFDM)系统频谱利用率的同时,调光范围略优于该系统,误码性能提高了3 dB。实验结果表明:本文提出的调光控制方法在不牺牲照明质量的同时具有更好的频带利用率和误码性能。

**关键词** : 可见光通信, 调光控制, 并行翻转正交频分复用(PF-OFDM), 调光范围

**Abstract** :

To achieve reliable high-speed data transmission and high quality lighting for an indoor Visible Light Communication (VLC), a new indoor visible light high-speed communication dimming control scheme was proposed based on a Pulse Width Modulation (PWM) technique and an Optical Orthogonal Frequency Division Multiplexing (O-OFDM). First, the working principle of Parallel Flip OFDM(PF-OFDM) was introduced and its good compromise performance in power efficiency, spectral efficiency and bit error rate were verified. Then the dimming performance of PF-OFDM system with the PWM technique was adopted and analyzed. Experimental results indicate that the spectral efficiency of the proposed dimming control scheme approximates the DC-biased optical OFDM(DCO-OFDM) system, the dimming range is slightly better than that of the DCO-OFDM system and the Bit Error Ratio(BER) has improved by 3 dB for 16QAM. Therefore, PF-OFDM dimming control scheme obtains better spectral efficiency and BER performance in the mean time without sacrificing illumination quality.

**Key words** : Visible Light Communication (VLC) dimming control Parallel Flip-orthogonal Frequency Division Multiplexing(PF-OFDM) dimming range

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