

光通信与光信息技术

水下无线光通信中的FDPIIM性能研究

姚文明, 饶炯辉, 张晓晖, 熊天林, 于洋

海军工程大学 兵器工程系, 武汉 430033

摘要:

为了改善脉冲位置调制需要符号同步和数字脉冲间隔调制、双头脉冲间隔调制、多幅度脉冲间隔调制符号长度不固定所引起的接收机结构复杂和调制器速率不固定等问题,提出将定长数字脉冲间隔调制应用于水下无线光通信系统。分析了带宽需求、传输容量,并与其它调制方式进行了比较;在给出水下无线光通信信道模型的基础上,推导了该信道中定长数字脉冲间隔调制方式的误包率表达式。结果表明,定长数字脉冲间隔调制适用于水下无线光通信系统。

关键词: 光通信 定长数字间隔脉冲调制 水下 差错性能

Performances of fixed-length digital pulse interval modulation in underwater wireless optical communication

YAO Wen-ming, RAO Jiong-hui, ZHANG Xiao-hui, XIONG Tian-lin, YU Yang

Department of Weaponry Engineering, Naval University of Engineering, Wuhan 430033, China

Abstract:

In order to improve the complex structure of the receiver and the transmitter and the unfixed rate of the modulator while pulse position modulation (PPM) needed symbol synchronization and digital pulse interval modulation(DPIM), dual-header pulse interval modulation(DHPIM), multilevel digital pulse interval modulation(MDPIM) had unfixed symbol length, fixed-length digital pulse interval modulation (FDPIIM) used in underwater wireless optical communication system was put forward. Bandwidth requirement and transmission capacity were analyzed, compared with on-off keying(OOK), PPM, DPIM and MDPIM. Based on the model of underwater wireless optical communication channel, packet error rate (PER) of FDPIIM for this channel was presented. The results show that FDPIIM is suitable for underwater optical wireless communication system

Keywords: optical communication fixed-length digital pulse interval modulation underwater error performance

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通讯作者: 饶炯辉, E-mail: 13995523850@139.com

作者简介: 姚文明(1989-),男,硕士研究生,主要从事无线光通信方面的研究。

作者Email: 13995523850@139.com

参考文献:

- [1] WANG H X, ZHU Y B, ZHANG T Y, *et al.* Performance study of optical wireless DH-PM and DPM[J]. Laser Technology, 2007, 31(1): 92-94(in Chinese).
- [2] SHIU D S, KAHN J M. Differential pulse position modulation for power-efficient wireless infrared communication[J]. IEEE Transactions on Communications, 1999, 47(8): 219-224.
- [3] SHIU D S, KAHN J M. Differential pulse position modulation for power-efficient optical communication [J]. IEEE Transactions on Communications, 1999, 47(8): 1201-1210.

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- [4] ZHAO L, KE X Zh, LIU J. Research on differential pulse position modulation in optical wireless communication[J]. Laser Journal, 2007, 28(2): 63-64(in Chinese).
- [5] ZHANG T Y, WANG H X, ZHU Y B, *et al.* Dual-amplitude pulse position modulation for optical wireless communications[J]. Laser Journal, 2007, 28(6): 71-73(in Chinese).
- [6] ZHANG T Y, WANG H X, HE W F, *et al.* Error coded modulation based on digital pulse modulation for in optical wireless communication[J]. Laser Technology, 2010, 34(6): 843-846(in Chinese).
- [7] GHASSEMLOOY Z, HAYES A R, SEED N L. Digital pulse interval modulation for optical communications [J]. IEEE Communications Magazine, 1998, 36(12): 95-99.
- [8] ALDIBBIAT N M, GHASSEMLOOY Z, McLAUGHLIN R. Error performance of dual header pulse interval modulation (DH-PIM) in optical wireless communications[J]. IEE Proceedings: Optoelectronics, 2001, J148 (2): 91-96.
- [9] ALDIBBIAT N M, GHASSEMLOOY Z, McLAUGHLIN R. Spectral characteristics of dual header pulse interval modulation (DH-PIM)[J]. IEE Proceedings: Optoelectronics, 2001, J148(5): 280-286.
- [10] GHASSEMLOOY Z, ALDIBBIAT N M. Multilevel digital pulse interval modulation scheme for optical wireless communications[C]//IEEE: 2006 International Conference on Transparent Optical Networks, ICTON 2006. Nottingham, UK: IEEE, 2006, 3: 149-153.
- [11] WEI W, HUA L H, ZHANG X H, *et al.* Performance on underwater optical wireless communication employing multilevel digital pulse interval modulation[J]. Laser Technology, 2011, 35(3): 330-333(in Chinese).
- [12] SIMPSON J A, COX W C, KRIER J R. 5Mbps optical wireless communication with error correction coding for underwater sensor nodes[C]//IEEE, OCEANS Conference-OCEANS, 2010. Seattle, WA, USA: IEEE, 2010: 1-4.
- [13] ZHANG T Y, WANG H X, CHENG G, *et al.* A novel fixed length digital pulse interval modulation for optical wireless communications[J]. Chinese Journal of Lasers, 2007, 34(12): 1655-1659(in Chinese).
- [14] KE X Zh, CHEN J N. Performance comparison of various pulse position modulation in wireless laser communication[J]. Laser Technology, 2012, 36(1): 67-76(in Chinese).
- [15] YU X N, LI J Y. The FPGA implementation of a novel modem for ultraviolet communication system [J]. Optical Communication Technology, 2009(12): 14-16(in Chinese).
- [16] GILES J W. Underwater optical communications systems part 2 basic design considerations [C]//IEEE: Military Communications Conference, 2005. MILCOM 2005. Atlantic City, NJ, USA: IEEE, 2005: 1700-1705.
- [17] SCHILL F, ZIMMER U R, TRUMPF J. Visible spectrum optical communication and distance sensing for underwater applications[C]//Proceedings of ACRA' 2004. Canberra, Australia: The Australia Robotics and Automation Association Inc., 2004: 1-8.

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1. 易森 陈名松 李天松 孙丽华. 时钟抖动对水下激光MPPM通信的误码影响分析 [J]. 激光技术, 2009, 33(6): 597-597
2. 易森. 激光通信系统中多脉冲位置调制帧同步的实现 [J]. 激光技术, 2010, 34(2): 164-164
3. 赵英俊. 舰船激光通信中大气湍流对系统误码率的影响 [J]. 激光技术, 2010, 34(2): 261-261
4. 孙丽华. LDPC码在水下激光通信中的研究 [J]. 激光技术, 2009, 33(6): 604-604
5. 徐香 王平 闫颖良 王禹. 低能见度下紫外光非直视传输模型研究 [J]. 激光技术, 2009, 33(5): 551-551
6. 卢静. 影响VCSOAs增益饱和和特性因素分析[J]. 激光技术, 2007, 31(5): 496-499
7. 刘宏展. 星间光通信发射终端激光耦合单元的设计及实验研究 [J]. 激光技术, 2007, 31(4): 416-416
8. 柯熙政 陈丹 屈菲. RoFSO系统中4FSK仿真及其误码率性能分析 [J]. 激光技术, 2010, 34(4): 0-0
9. 何华 柯熙政 赵太飞 冯艳玲. 无线“日盲”紫外光网格网中的定位研究 [J]. 激光技术, 2010, 34(5): 0-0
10. 王光斌 张世禄. 基于变换域插值的残余码间干扰消除算法 [J]. 激光技术, 2010, 34(5): 0-0