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一种新颖的宽带地空通信系统方案

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摘要 低仰角下的宽带地空通信信道存在严重的多径衰落现象，其信道特性与地面移动通信的情况很不相同，不适于采用正交频分复用技术，为此建立了低仰角下的宽带地空信道模型，并提出了一种正交码分复用与分组编码技术相结合的通信系统方案．理论分析和仿真实验结果表明：该系统能够容忍40个码元以内的多径时延，当信道的莱斯因子在6～7dB时仍然可以获得很好的误码特性．由于该系统采用多值PN码M元扩频实现正交码分复用，因此其频带效率与非扩频系统相同;其次其码元较短，因而对信道动态变化的适应能力优于相应的正交频分复用系统．此外，它不必进行信道估计和均衡，因而其硬件实现的复杂度很低，在宽带地空通信中具有很好的应用前景．

关键词 地空通信 正交码分复用 分组编码 多径衰落
分类号 TN911.7

Novel scheme for the wide band ground-air communication system

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Abstract

For a wide band ground-air communication system with a low elevation antenna, the channel is of severe multi-path fading, whereas its characteristic is quite different from that of a terrestrial mobile communication channel. In this case, the OFDM technique is considered to be unsuitable, so that a channel model is established and a new scheme based on orthogonal code division multiplexing (OCDM)combined with block coding is proposed. Theoretical analysis and simulation results show that the proposed system can suffer so great a multi-path delay up to dozens of symbol periods, and has very good BER performance even when the Rice fading factor reaches6～7dB. The system can obtain as high a band efficiency as a non-spectrum-spreading system since it realizes OCDM based on M-ary spectrum spreading of multi-level PN codes. Compared with a corresponding OFDM system, it has better adapting capability to dynamic variation of the channel because of its shorter symbol period. Besides, it has low implementation complexity since channel estimation or equalization is not necessary. It has a good potential in wide band ground-air communication applications.

Key words ground-air communication code division multiplexing block coding multi-path fading

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