

一种适应高多普勒频偏的突发传输高效导频图案

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A Novel Pilot Structure for Burst Transmission under High Doppler Shift

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摘要

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摘要 导频符号辅助调制技术广泛应用于数字通信系统的突发传输。在频偏范围较大和信噪比较低时, 现有的前后式导频方案的频偏估计误差会远高于理论下界。该文研究了频偏估计最大似然检测的主瓣和旁瓣分布, 分析了对称分布导频图案在频偏估计时的模糊问题。在此基础上提出了一种新的混合对称式导频图案, 并给出了相应的参数选取原则。新导频图案能够在较低的信噪比下具有大的频偏估计范围和较高的估计精度。仿真结果验证了新导频图案的良好性能。

关键词: 无线通信 突发传输 导频图案 频率估计 克拉美劳下界

Abstract: Pilot Symbol Assisted Modulation (PSAM) is widely used in the digital burst transmission system. The frequency estimation of a Pre+Post pilot structure departs from its Cramér - Rao Lower Bound (CRLB) when frequency error is large and SNR is low. In this paper, the distribution of the main lobe and side lobe of the maximum likelihood measurements is derived for the estimation of symmetric pilot structure's frequency and the estimation ambiguity issue is analyzed. Then, a novel mixed pilot structure is proposed and the principles of selecting parameters are given. This new pilot structure can deal with high Doppler frequency shift with high precision under low SNR. The simulation results show the advantages of this pilot structure.

Keywords: Wireless communication Burst transmission Pilot structure Frequency estimation Cramér - Rao Lower Bound (CRLB)

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