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乘性噪声环境下基于符号秩统计量的非参伪码捕获方法

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A Method of PN Code Acquisition Using Signed-rank-based Nonparametric Detector in Multiplicative Noise

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摘要 扩频系统常常工作在多径环境中，伴随着加性噪声的同时往往还存在着乘性噪声。该文提出了一种乘性噪声环境下基于符号秩统计量的非参伪码捕获方法，将伪码捕获等价为假设检验问题，利用局部最佳检测算法推导出了乘性噪声环境下基于符号秩的检测统计量，通过简化记分函数进一步给出了局部次佳秩检测器。将局部次佳秩检测器与局部最佳检测器和平方和检测器的性能进行了仿真对比，结果表明该文所提出的捕获方法在乘性噪声环境下检测性能接近乘性噪声环境下的局部最佳检测器，而较平方和检测器则有较大幅度的提高。

关键词： 扩频通信 伪码捕获 符号秩统计量 非参数检测 局部最佳检测 乘性噪声

Abstract： The spread-spectrum system usually works in the multipath environment, along with the additive noise there always be some multiplicative noise. In order to solve the Pseudo-Noise (PN) code acquisition in multiplicative noise channel, a new detector using signed-rank-based nonparametric detector is proposed in this paper. Modeling the acquisition problem as a hypothesis testing problem, a detector is derived for multiplicative noise, based on signed-rank statistics using the locally optimum detection technique. Then the Locally Suboptimum Rank (LSR) detector is proposed by using approximate score functions. Numerical results show that the LSR detector can offer substantial performance improvement over the conventional squared-sum detector in multiplicative noise channels and asymptotically has almost the same performance as the locally optimum detector in multiplicative noise.

Keywords： Spread-spectrum communication   Code acquisition   Signed-rank statistics   Nonparametric detector   Locally optimum detection   Multiplicative noise

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