

应用

基于FPGA的GPS实时伪距测量新方法

李晓翠, 胡铁乔, 吴仁彪, 卢丹, 王文益

中国民航大学天津市智能信号与图像处理重点实验室

摘要:

同步检测是伪距测量的重要组成部分, 本文提出了一种兼顾可靠性和实时性的同步检测方法。该同步检测方法结合前导码比特匹配、奇偶校验, 提高检测实时性; 通过加强同步状态持续有效条件、利用前导码的周期性, 提高检测可靠性。进一步将该同步检测方法多通道并行C/A码跟踪结合, 给出了一种实时伪距测量新方法, 并在FPGA上实现了该伪距测量方法。仿真结果证明了本文提出的同步检测方法具有低误检测率、延时短的优点; 对基于本文提出的伪距测量方法的GPS实时接收机进行定位测试, 测试结果显示硬件接收机能够实现有效定位, 表明提出的伪距测量方法能够为定位提供实时、准确、稳定的伪距信息。

关键词: 全球定位系统 伪距 帧同步 码跟踪 现场可编程门阵列

A Novel Method of GPS Real-Time Pseudo Range Measurement Based on FPGA

LI Xiao-Cui, HU Tie-Qiao, WU Ren-Biao, LU Dan, WANG Wen-Yi

Tianjin Key Laboratory for Advanced Signal Processing, Civil Aviation University of China

Abstract:

The synchronization detection plays an important role in pseudo range measurement. A new synchronization detection method was proposed that the real-time property of detection was improved by combining the string matching with parity check, and the reliability was raised by enhancing the condition of keeping synchronous state. Furthermore, a proposal for real-time pseudo range measurement was given that consisted of the proposed synchronization detection method and multi-channel parallel Coarse Acquisition (C/A) code tracking. The real-time pseudo range measurement was implemented based on Filed Programmable Gate Array (FPGA). The simulations results show that the proposed method of synchronization detection has the advantage of low mistaken detection rate and short delay. Finally the test results show that the Global Position System (GPS) receiver based on the novel proposal for real-time pseudo range measurement can position effectively and they indicate the novel proposal for improved real-time pseudo range measurement can provide precise and real-time pseudo range information for position.

Keywords: Global Position System (GPS) pseudo range synchronization code tracking Filed Programmable Gate Array (FPGA)

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通讯作者:

作者简介:

作者Email: sally050119@163.com

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1. 卢丹, 吴仁彪, 王磊. 一种通用的GPS多类干扰抑制方法[J]. 信号处理, 2010,26(5): 682-686
2. 吴向宇, 欧钢, 孟繁智, 王瑛, 陈杰. 射频与基带参考时钟不同源对GPS载波相位平滑伪距定位的影响[J]. 信号处理, 2101,26(8): 1132-1136

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