一种 Nios II 软核架构的高效 GPS 捕获方法

田　嘉，王　伟，史平彦

（中国空间技术研究院 西安分院，陕西 西安 710100）

摘　要：针对传统 GPS 接收机不能根据接收信号的特性自适应的调节频率搜索范围及积分时间的问题，本文提出了一种 Nios II 软核架构的高效 GPS 捕获方法，其可以通过 Nios II 软核自适应调节频率搜索范围、相干积分时间及非相干积分时间，流水线式的 VHDL 结构仅负责并行处理，实现了参数调节的灵活可控.通过采用仅有一片 Stratix III FPGA 的基带开发板，实测结果表明，捕获功能性能正常，频率捕获范围可在 100 Hz~80 kHz 内灵活切换，积分时间可在 1 ms~30 s 内灵活切换.

关键词：Nios II；信号捕获；Stratix III FPGA；GPS

The GPS acquisition method based on Nios II soft core

TIAN Jia，WANG Wei，SHI Ping-yan

（China Academy of Space Technology(Xi′ an), Xi′ an 710100, China）

Abstract：In order to solve the problem that the traditional GPS receiver cannot adjust the frequency search space and integration time adaptively according to the characteristics of the received signal, the GPS acquisition method based on Nios II soft core is presented by this paper. The Nios II soft core is responsible for accommodate the frequency search space, the coherent integration time and the non-integration time. The VHDL part of assembly line structure is responsible for the parallel data processing. Therefore, the parameters can be adjusted adaptively by the method. By using the conception product which embeds 1 Stratix III chip, real test result shows that the acquisition works well, the frequency search space can be changed within 100 Hz-80 kHz and the integration time can be changed within 1ms-30s.

Key words：Nios II; signal acquisition; Stratix III FPGA; GPS

作者简介：

田　嘉　男，（1987-），硕士，高级工程师.研究方向为空间通信与导航技术.E-mail:jia_epfl_tian@163.com.

王　伟　男，（1970-），硕士，研究员.研究方向为空间通信与导航技术.

史平彦　男，（1964-），硕士，研究员.研究方向为导航与遥感技术.