

新型皮卫星星载接收机设计

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摘要：

传统星载接收机体积大、结构复杂、功耗高，无法满足皮卫星的应用要求；而项目组已研制成功的星载接收机虽然克服了这一缺点，但灵敏度不高，这就严重了它的使用范围。本文在分析两者结构特点的基础上提出了一种基于数字式频率合成器和模拟锁相环混合结构的新型皮卫星星载接收机结构，并对该结构的锁相、噪声和灵敏度进行了分析、仿真实验和样机实测，实验证明仿真结果与实际相互吻合，实验结果满足要求。新型结构与传统星载接收机相比大大减小了体积降低了功耗，简化了结构，而性能与传统星载接收机相当，可以较好的满足皮卫星的应用要求。

关键词：皮卫星；测控应答机；星载接收机；载波跟踪环

A new receiver structure of TT&C Transponder for Pico-satellite

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Abstract:

The traditional receiver requires large volume, complex structure design and high power consumption. These characteristics don't fit the requirement of the Pico-satellite application. Meanwhile, a low-power receiver structure has already been proposed by our team. But this low-power receiver has low sensitivity and thus can't be used widely. To resolve these problems, a new receiver structure is proposed in this paper. This new structure mixes digital frequency synthesizer with traditional PLL. The lock time, noise behavior and sensitivity of this new structure are analyzed and tested. The result shows that the simulation and the experiment are perfectly matched, and the performance meets the requirement well. This new structure can not only preserve the excellence of traditional receiver, but also can make the loop design much easier with less volume and lower power consumption, which are all critical to Pico-satellite.

Keywords: Pico-satellite; Transponder; Receiver; Carrier tracking loop

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