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信息科学

基于时间放大技术的新型时间电压转换器

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**摘要:** 为解决传统的模拟时间内插法测量回波飞行时间时存在温度非线性及长死区时间的问题, 提出了一种基于时间放大技术的时间电压转换器。讨论了电压转换器电路的设计和电容参数不同配置对转换器性能的影响。选用分立元件设计了一款时间电压转换器原型电路, 搭建了电压转换器性能测试平台, 并进行了性能测试实验。结果表明: 提出的新型时间电压转换器能从原理上减小测试死区时间, 消除时钟抖动、PVT (Process, Voltage and Temperature) 参数变化对电路性能的影响。在有效输入范围内, 微分非线性误差小于 0.45 LSB, 积分非线性误差小于 0.6 LSB, 满足高精度和实时测量回波飞行时间的需要。

**关键词:** 时间电压转换 时间放大 参数配置 微分非线性 积分非线性

## Time to Voltage Converter Based on Time Amplifiers

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**Abstract:** To overcome the shortcomings like temperature nonlinearity and long-dead time for measuring echo flight-time in traditional analogy interpolation method, a new time voltage converter based on time amplification technology was proposed. The circuit structure and influences of different configurations of capacitive parameters on the performance of the convertor were discussed in detail. A prototype circuit of the time voltage convertor using discrete components was designed and a test platform was constructed to test the performance of the convertor. The results show that the designed time voltage convertor can reduce measurement dead time and eliminate the influence caused by clock jitter and PVT (Process, Voltage and Temperature) parameter variations. In the valid input range, the differential and integral nonlinearity errors are less than 0.45 LSB and 0.6 LSB, respectively, which meets the needs of echo flight-time measurement for high-precision and real-time.

**Keywords:** time-voltage converter time amplification parameter configuration differential nonlinearity integral nonlinearity.

收稿日期 2013-06-08 修回日期 2013-08-16 网络版发布日期 2013-12-25

基金项目:

基于超声波的管道流量测量及流速分布层析成像方法研究

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