

基于SOPC的时栅位移传感器信号处理系统设计

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摘要：

摘要：为了提高时栅位移传感器的动态性以及测量精度，设计了一种基于SOPC技术的时栅信号处理系统，将数据的采集和处理集成在一片FPGA内，采用NiosII处理，并将复杂的乘除运算加入了自定义指令，提高了时栅传感器的数据处理效率，采用傅氏级数谐波修正技术来进行误差修正，大大提高了测量精度。实验表明，采用该系统后，时栅在每分钟8转情况下误差峰峰值为2.2''。

关键词：信号处理；动态测量；SOPC；时栅；角位移；传感器

Design of Signal Processing System of Time Grating Displacement Sensor Based on SOPC

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Abstract:

Abstract: In order to improve the dynamic stability and processing speed of the time grating displacement sensors, a signal processing system based on SOPC technology is designed. The function of data acquisition and processing are integrated in the FPGA chip inside, the NiosII technology is adopted for data processing. In addition, the custom instructions are added into some complex multiplication and division to improve the data processing efficiency, and harmonic error correction technology is adopted for measurement error correction. As a result, the measurement precision is improved. The experiment results show that the measurement peak-to-peak value is only 2.2'' for the rotation speed of 8 revolution per minute.

Keywords: Signal processing ; Dynamic measurement; SOPC; Time grating; Angular displacement ; Sensor

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