

PSD微位移测量系统的设计与验证

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摘要：

以提高PSD输出微弱电流信号的稳定性和精度为目的，讨论了PSD驱动、运放电路的设计。主要考虑因素包括：两级精密运放选择，电源滤波模块设计，PCB设计中数模抗干扰，电源和地的处理，抗环境光干扰，PSD及其运放电路集成化，以及适应不同漫反射性质的被测物体的多路放大倍数设计等。最后，区别于传统的测量方案，本文采用一种基于标定测量的方法。通过音叉振动波形和定点距离测量实验，验证了PSD微位移测量系统的稳定性和精度都较好，测量范围20mm，位移测量相对精度达到1.01%。

关键词：PSD，运放电路，标定测量，稳定性，精度

The design and validation of PSD tiny displacement measuring system

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Abstract:

Abstract: In order to improve the stability and precision of PSD output feeble current signal, this paper discusses the design of PSD drive and op-amp circuit. Main considerations include the selection of two levels precision op-amp, the design of power filtering module, digital analog anti-interference design in PCB, handling of power supply and ground, anti-interference of ambient light, the PSD and the op-amp integrated circuits, and the design of multi-channel magnification to adapt the different diffuse nature of the object to be tested, etc. In the end, different from traditional measurement scheme, this paper adopts a new method based on calibration measurement. By measuring the vibration waveform of tuning fork and fixed-point distance, it verifies that the stability and precision of the PSD tiny displacement measuring system is very good, and the measuring range is 20 mm, the displacement relative accuracy is up to 1.01%.

Keywords: PSD; op-amp circuit; calibration measurement; stability; precision

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