

(中国微米纳米技术学会文章) 一种硅微机械结构振动幅度的电学测量方法及实验研究

作者: 刘恒, 范江棋, 孟瑞丽, 李宏升, 张宏群, 周吴

单位: 南京信息工程大学

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摘要:

本文针对硅微机械结构振动幅度由于封装难以计算机视觉测量及电学测量中的精度受接口电路参数影响的问题, 在对静电梳齿驱动、平板电容检测的硅微谐振结构进行建模分析后, 提出基于单边带电压比的电学测量振动幅度的方法并分析了测量方法的原理。实验表明研制的某硅微机械谐振加速度计在受迫振动下的振动幅度为0.25 μm , 频谱分析还表明存在上电噪声引起的振动幅度, 该测试方法还能应用于硅微谐振结构的谐振频率测量, 同时为高品质因数的硅微机械谐振结构的可静电自激驱动提供了依据。

关键词: 硅微机械结构; 振动幅度; 单边带比; 频谱

Electrical measurement method and experiment study on vibration amplitude for a silicon micro-structure

Author's Name:

Institution:

Abstract:

Because of the drawback of computer aided vision measurement method for packaged silicon micromachined structure, also, for electrical measurement, accuracy is affected by the interface circuit parameters, first, this paper construct the model for a silicon resonant micro structure with driving combs and sensing parallel-plates, and propose a new electrical measurement based on single sideband ration. Experiment result show that the vibration amplitude is 0.25 μm for a resonant micro accelerometer with 20kHz AC driving voltage. Spectral analysis also showed the presence of vibration amplitude caused by electrical noise, this test method can also be applied to measure the resonant frequency for silicon micro structure.

Keywords: Silicon micromachined structure; vibration amplitude; single sideband ration; frequency spectrum

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