

静电刚度谐振式微加速度计及其接口电路分析

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摘要：

根据静电加载在平板电容器上产生等效静电负刚度原理，分析了基于静电刚度的谐振式微加速度计的敏感过程。针对有效信号检测中存在的同频干扰问题，建立了接口电路的等效模型，并根据干扰源提出在信号处理电路采用方波调制、开关解调的抑制方法。仿真和实验表明制造的加速度计检测端静态检测端静态电容约为0.4pF, 实验条件下的变化检测电容为3.1fF, 同频干扰耦合电容约为0.04pF。频率调制解调方法实现了加速度计振动信号的拾取，在真空封装下品质因数为1400, 谐振频率为35.476 kHz。

关键词：微加速度计，同频干扰，接口电路，调制

Principle and Interface Circuit Analysis for a novel type Resonant Accelerometer

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Abstract:

The dynamic model for the novel type resonant accelerometer is built based on electrostatic negative stiffness theory. The no-linear relationship between the output frequency and acceleration is given. Built the equivalent interface model for the same frequency disturbance in the detecting end, some advices were given in structure design to restrain the disturbance. Chose the square wave as the sensing voltage, made use of the switch to demodulate the input weaken signal for experiment. The static capacitance is 0.4pF, coupling part is 0.04pF and effect sensing capacitance is 3.1fF in the sensing end. The method is use full of to acquire the open loop characteristic for resonant accelerometer. The resonant frequency is 35.476kHz, Q factor is about 1400.

Keywords: micro-accelerometer; same frequency disturbance; interface circuit; modulate

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