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两种结构MEMS磁场传感器的研究

作　者：陈洁

单　位：东南大学MEMS教育部重点实验室

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摘　要：

本文研究了两种结构的谐振式磁场传感器，检测在磁场作用下梁的振动幅度，来实现磁场的测量。首先介绍了传感器的工作原理，并用振动理论对传感器的受力及响应进行了分析，接着用有限元软件建立结构模型，对振动幅度进行了仿真。该MEMS磁场传感器采用标准的CMOS工艺加上后处理来实现。最后用多普勒仪对传感器的振动幅度进行测试，实验结果与理论分析一致，并对两种传感器性能进行比较。所研究的两种传感器结构简单，测试方便，可用于对mT级的磁场进行测试。

关键词：磁场传感器;MEMS;洛仑兹力;谐振

Design and experiment of MEMS magnetic sensor

Author's Name:

Institution:

Abstract:

Resonant magnetic field sensors are studied using two different structures. The magnetic field is obtained by measuring the induced electromotive voltage of the coil of the mechanical structure. The working principles of the sensor are introduced first, and the force and response of the sensor are developed using the vibration theory. Then the structural model is established and the vibration amplitudes are simulated using the finite element software simulation. These micro-electro-mechanical systems (MEMS) devices are realized through a standard CMOS process coupled with a post-processing phase. A laser Doppler vibrometer system is implemented to measure the vibration amplitudes of the fabricated structure. The performance of two sensors is compared and a good agreement is observed between the predicted and observed behavior of the magnetic field sensor. The sensor is of simple structure and easy fabrication demonstrating their utility as a magnetic field of mT level.

Keywords: magnetic sensor, MEMS, Lorentz force, resonate

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