

一种新型电磁式微机械陀螺的结构设计与仿真

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摘要:

介绍了一种基于介观压阻效应的新型电磁式微机械陀螺, 对陀螺进行了结构设计。该结构采用电磁驱动方式, 实现了工作电压小、驱动力大、行程大的要求; 采用共振隧穿二极管(RTD)所具有的介观压阻效应检测方式, 本质上提高了陀螺的灵敏度。用ANSYS软件对结构进行了模态分析和路径分析, 确定了结构的固有频率和RTD放置位置。结合目前工艺要求, 对该陀螺进行了工艺设计并实现了结构加工。

关键词: 电磁驱动, 介观压阻效应, 结构设计, 微机械陀螺

The Structure Design and Simulation of a Novel Electromagnetic Micromachined Gyroscope

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Abstract:

A novel electromagnetic drive micromachined gyroscope based on meso - piezoresistive effect is proposed and the structure is designed in this paper. The method of electromagnetic drive is used, which achieves the requirement of low operating voltage, large driven force and great displacement. The sensitivity of gyroscope is increased essentially by using the meso-piezoresistive effect of resonant tunneling diodes. The modal simulation and path analysis is processed using the ANSYS software, which determines the natural frequencies and location of the resonant tunneling diodes. According to the present process technology, the process design of gyroscope is presented and the structure fabrication is achieved.

Keywords: electromagnetic drive, meso-piezoresistive effect, structure design, micromachined gyroscope

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