

一种新型谐振式MOEMS陀螺的设计及分析

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基金项目:

摘要:

提出一种新型的利用空间光路敏感Sagnac效应的谐振式MOEMS陀螺, 设计了利用微镜构成的光学谐振腔。此结构具有小型化优势, 可利用MOEMS工艺进行加工。理论分析了光源及谐振腔参数对陀螺基本探测极限的影响, 指导参数设计, 得到陀螺的极限灵敏度为 $1.54\text{ }^\circ/\text{h}$ 。通过模式匹配理论对谐振腔型式进行了改进了谐振腔损耗。进行了谐振腔原理验证实验, 观察到谐振曲线。最后对微谐振腔的加工工艺进行了讨论。

关键词: 陀螺, 微光机电系统, 谐振腔, 微镜, 原理验证

Analysis and design of a novel MOEMS resonator gyroscope

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Abstract:

A resonator MOEMS gyroscope which uses spatial light paths to sensitive Sagnac effect is presented. And spatial resonator structure composed of micromirrors was designed. The structure of the gyroscope has advantages in microminiaturization. It could be manufactured using MOEMS technics. The influence of parameters of light source and resonator to the fundamental detection limit of the gyroscope was analyzed, which instructed the design of parameters. The fundamental detection limit of the gyroscope can be $1.54\text{ }^\circ/\text{h}$. The style of the resonator was improved using mode matching theory, and the loss of the resonator was decreased. Theorem proving experiment of the resonator was made, and the resonatory curve was observed. In the end, the manufacture technics of the micro-resonator was discussed.

Keywords: gyroscopes, MOEMS, resonator, micromirror, Theorem proving

投稿时间: 2010-03-31