

基于数字调节方法的MEMS陀螺零位补偿技术研究

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基金项目:

摘要:

针对环境温度影响导致MEMS陀螺零位输出变化较大的问题, 文中设计了一种基于数字调节方法的零位补偿电路并提出了一种陀螺零位漂移特性的测试方法。该补偿电路依据陀螺内部温度传感器输出, 实时调节补偿电路输出, 实现零位补偿。采用全温(-40℃~60℃)测试方法, 研究得到陀螺零位漂移模型, 再经过研究零漂值与补偿电路值之间的对应关系, 求解出温度与补偿值之间的数学模型。实验表明, 采用该方法使陀螺零位在全温范围内稳定精度提高了一个数量级, 证明了本文提出方法的可行性和有效性。

关键词: MEMS陀螺; 数字调节; 零位补偿; 零位漂移; 全温测试

Research on zero compensation for MEMS gyroscope based on digital regulation

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Abstract:

Zero output of MEMS gyroscope is significantly influenced by the ambient temperature. To solve this problem, a zero compensation circuit based on digital regulation was designed and a test method of zero-drift characteristic was presented. The output of compensation circuit was adjusted real-time according to the output of internal temperature sensor of gyroscope to realize zero compensation. Using full temperature (-40℃~60℃) test method, a zero-drift model of gyroscope was obtained, and a math model of temperature and compensation circuit was also calculated based on the relationship between zero-drift value and output value of compensation circuit. The results showed that using this method can improve the stable accuracy of gyroscope's zero output by one order of magnitude in the range of full temperature, and also can prove the feasibility and validity of the compensation.

Keywords: MEMS gyroscope; digital regulation; zero compensation; zero-drift; full temperature test

投稿时间: 2012-08-27

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