

一种新型六维加速度传感器原理研究

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摘要：

为克服现有六维加速度传感器的不足，提出并研究了一种单惯性质量块的压电式六维加速度传感器。介绍了传感器的结构和工作原理，推导了其数学模型，运用ANSYS有限元软件对传感器的灵敏度、维间耦合度、固有频率等特性进行了仿真研究。研究表明：该六维加速度传感器能够实现6维加速度的传感；各维间的耦合属于线性耦合，可通过简单的矩阵运算予以完全解耦；固有频率有望比现有3维线加速传感器或3维角加速度传感器提高3倍以上。

关键词：六维；加速度传感器；压电；原理

Principle Study of a Six-axis Acceleration Sensor

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Abstract:

In order to overcome the deficiencies of the existing six-axis acceleration sensor, a six-axis acceleration sensor with single inertial mass is proposed and studied. The structure and working principle of the sensor are presented, and the corresponding mathematical model is derived. The characteristics including the sensitivity, coupling degree and natural frequency are simulated and analyzed by ANSYS finite element software. Research results show that, the sensor can measure six-axis acceleration, and the dimension coupling is linear which can be decoupled completely through simple matrix operations, and the natural frequency is increased three times of the existing three-axis line acceleration/angular acceleration sensor.

Keywords: Six-axis; Acceleration sensor; Piezoelectric; Principle

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