Frequency Tuning of Disk Resonator Gyros via Resonator Mass Perturbation

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SUMMARY

UCLA researchers in the Department of Mechanical and Aerospace Engineering have developed a new method for tuning the resonant modes in MEM vibratory gyroscopes using mass perturbation of the sensor's resonant structure.

BACKGROUND

MEM vibratory gyroscopes have become smaller, less expensive, and more pervasive in the marketplace. Although vibratory gyroscopes have become more technologically advanced, they are still prone to detuned resonances. Traditionally, electrostatic tuning of the resonant modes is often suggested as a means for compensating manufacturing aberrations that produce such detuned resonances. In high performance sensors, however, this approach places very stringent requirements on the stability of the bias voltages used for tuning. Furthermore, the bias voltage stability must be maintained over the operating environment, especially with regard to temperature variations.

INNOVATION

Researchers at UCLA have developed a new method for resonant mode tuning using mass perturbations of a sensor's resonant structure. The technique only relies on the sensor's integrated actuators and pick-offs to guide the mass perturbation process.

APPLICATIONS

Systematic application to disk resonator gyroscopes in a turn-key manner

ADVANTAGES

- Algorithm is amenable to automation
- Eliminates the requirement that the modal nodes of the resonator be identified by direct measurement

STATE OF DEVELOPMENT

The invention has been conclusively demonstrated on a large-scale Disk Resonator Gyroscope. Research will continue to apply the method to the miniature Disk Resonator Gyroscopes.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,333,112	12/18/2012	2008-669

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OTHER INFORMATION

KEYWORDS

Gyroscope, MEMS gyroscope, Disk Resonator Gyro

CATEGORIZED AS

- **Sensors & Instrumentation**
  - Position sensors

RELATED CASES

2008-669-0

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