

Q factor trimming for Oscillator

adjust the Q factor of multiple orthogonal modes

Overview

Although the Q factors of the 2D oscillator used in gyroscope must be matched in the x and y axial directions, they may differ slightly due to manufacturing error, etc. Thus, Q factor in each x and y axial direction needs to be matched independently.

In a oscillator, vibration generates heat flow which affects the Q factor (thermoelastic loss). Therefore, it is possible to adjust the Q factor by adding a heat flow path in the structure or by blocking the heat flow.

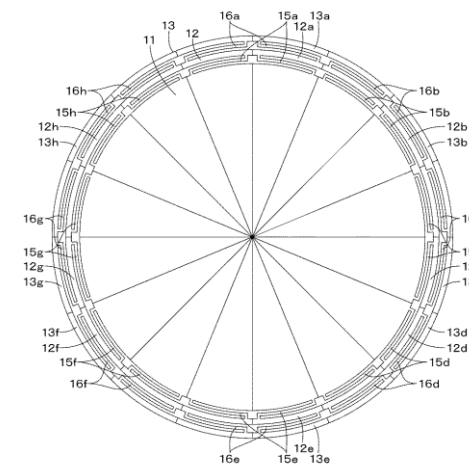
The 2D oscillator of this invention has a pre-fabricated machinable part to control the heat flow without changing significantly the stiffness, in addition to its basic structure. The Q factors in the 1st and 2nd modes, which are orthogonal to each other, can be controlled independently by cutting this machinable part appropriately.

Product Application

- Oscillator used in gyrosensor

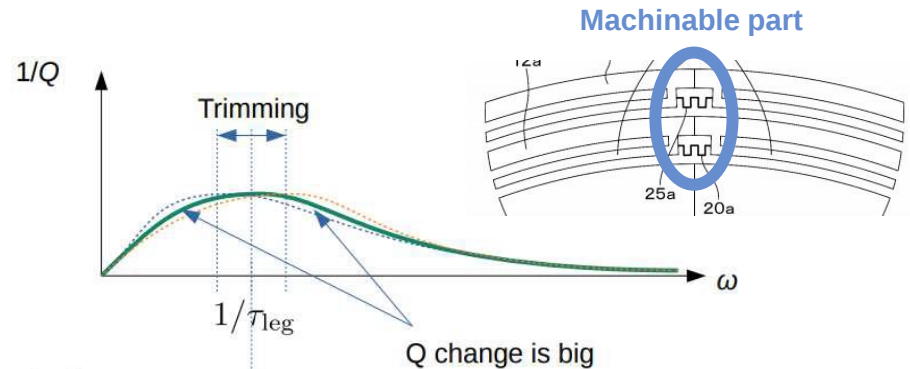
IP Data

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Example of gyroscope configuration

Adjust the Q factor by machining the machinable part



Related Works

[1] A. Hamza, T. Tsukamoto and S. Tanaka, "Quality Factor Trimming Method Using Thermoelastic Dissipation for Ring-Shape MEMS Resonator," in Proc. 2020 IEEE International Symposium on Inertial Sensors and Systems (INERTIAL), 2020, pp. 1-4.

Contact