

Resonators for Temperature-Stable Oscillators

A new design for resonators that will stabilize temperatures at high frequency rates.

Georgia Tech inventors developed a method to design high frequency resonators using a distributed Lamé mode, which is a resonator that is designed to vibrate within the plane of fabrication, while retaining the advantages of a square Lamé mode. This process will extend the mode with a distributed arrangement across a beam or a frame structure to allow for efficient temperature stability, while scaling up the frequency. In turn, this will provide for a reduced motional resistance, as well as providing the resonator with no dimensional constraints or limitations on performance scaling.

Summary Bullets

- **Reduced motional resistance** – by using the distributed arrangement for the mode shape
- **Performance scaling** –added design freedom of the resonator
- **Compatibility** –no dimensional constraints

Solution Advantages

- **Reduced motional resistance** – by using the distributed arrangement for the mode shape
- **Performance scaling** –added design freedom of the resonator
- **Compatibility** –no dimensional constraints

Potential Commercial Applications

- Very high frequency (VHF) military
 - Navigation radar
 - GPS
- Mobile phones

Background and More Information

With the increasing trend of cellular devices becoming slimmer, Micro-Electro Mechanical System (MEMS) resonators are at the forefront of the market, and, likewise, their demand is also increasing. The use of such resonators in cellular devices include three to five timing devices, which directly utilize the resonators for oscillation. Other uses of resonators in cellular devices include shock and vibration resistance and low power consumption. Current technology, however, cannot use a temperature turnover point method at high frequency

due to fabrication and dimension constraints. Therefore, there is a need for temperature stability at high resonance frequency.

Inventors

- Dr. Farrokh Ayazi
Professor and Director of Integrated MEMS (IMEMS) Laboratory – Georgia Tech School of Electrical and Computer Engineering
- Anosh Durawalla
Graduate Research Assistant – Georgia Tech School of Electrical and Computer Engineering

IP Status

<p>Patent has issued</p>: US11533042

Publications

[Distributed Lamé mode resonators for temperature-stable high frequency mems oscillators, -](#)

Images

Visit the Technology here:

[Resonators for Temperature-Stable Oscillators](#)

<https://s3.sandbox.research.gatech.edu//print/pdf/node/3443>