

Symmetrical In-Plane Resonant Gyroscope with Decoupled Modes

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Abstract : A symmetrical single mass resonant gyroscope is discussed in this paper. The symmetrical design allows matched resonant frequencies for driving and sensing vibration modes, which leads to amplifying the sensitivity of the gyroscope by the mechanical quality factor of the sense mode. It also achieves decoupled vibration modes for getting a low zero-rate output shift and more stable operation environment. A new suspension beams design is developed to get a symmetrical gyroscope with matched and decoupled modes at the same time. Finite element simulations are performed using ANSYS software package to verify the theoretical calculations. The gyroscope is fabricated from aluminum alloy 2024 substrate, the measured drive and sense resonant frequencies of the fabricated model are matched and equal 81.4 Hz with 5.7% error from the simulation results.

Keywords : decoupled mode shapes, resonant sensor, symmetrical gyroscope, finite element simulation

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