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Title: High-performance MEMS accelerometers with quasi-zero stiffness

Abstract: Advances in MEMS technology with respect to fabrication, integration with circuit and control enable mimicking a macro space accelerometer which is advantageous in terms of sensitivity and noise. MEMS accelerometers with quasi-zero stiffness using electrostatic stiffness and force-rebalance control are demonstrated. It reduces the manufacturing difficulty of an acceleration-sensitive mass without any mechanical suspension. The performance of ultra-low noise and ultra-high sensitivity is understood based on the investigation of the noise model and effects. The single-axis, two-axis and Z-axis MEMS accelerometers with quasi-zero stiffness are developed with outstanding bias instability, cross-axis coupling and bandwidth, offering a miniaturized low-power yet high-performance option for specific applications.

Biography: Dr. Zhipeng Ma obtained his M.Sc. and Ph.D degrees in Engineering from Tianjin University, China, in 2012 and Kyoto University, Japan, in 2016, respectively. After a one-and-a-half-year Postdoc career at Kyoto University, he joined Zhejiang University, China, as a lecturer. He is now an Associate Professor in the School of Aeronautics and Astronautics and the vice director of the Micro-satellite Research Center. He is also an active member of many domestic and international committes and societies. In 2024, he organized the IEEE International Symposium on Inertial Sensors and Systems as a TPC co-chair. Dr. Ma is currently engaged in the research of MEMS inertial sensors, optical image stabilization systems and artificial-intelligence control. He has over 30 publications in the area of MEMS and patents.