

“Design and Analysis of MEMS Gyroscopes”

Diego Emilio Serrano, Qualtré

The unprecedented success of inertial sensors in portable electronics, and in particular wireless devices, has made micromechanical gyroscopes the fastest growing sector in the MEMS market. The demand for sensors that are accurate enough to implement pedestrian navigation systems (PNS), capable of operating in the absence of GPS, has accelerated the need for improvements in performance, power consumption and miniaturization. Moreover, application spaces such as automotive and military require enhancements in the robustness and reliability of existing designs.

In this tutorial, the operation principles of MEMS gyroscopes will be presented; different types and operation methods of vibratory rotation-rate sensors will be covered. Emphasis will be placed on the implementation techniques and advantages of mode-matched devices. New trends on the development of single-die inertial sensors will be covered, including details on the design of high frequency bulk-acoustic wave (BAW) gyroscopes.



Diego Emilio Serrano is a MEMS development engineer at Qualtré, Inc., in Marlborough, MA. He has 5+ years of experience in the design and characterization of MEMS inertial sensors and resonators, and interface electronics. Mr. Serrano received the B.S. degree in electronics engineering from the Pontificia Universidad Javeriana, Bogotá, Colombia (2007), and the M.S. degree in electrical engineering from the Georgia Institute of Technology, Atlanta, GA (2009). He is currently pursuing a Ph.D. degree in electrical engineering at this same institution, where he was also the recipient of the Goizueta Foundation Fellowship for two consecutive years (2011, 2012). Mr. Serrano serves as technical reviewer for the Journal of

Microelectromechanical Systems (JMEMS), the Transactions on Electron Devices (T-ED), and is part of the technical program committee for the 2014 international symposium of inertial sensors and systems (SISS 2014).