IEEE Inertial Sensors & Systems Symposium 2018 Organizers

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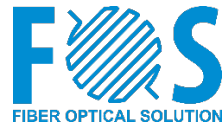
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Exhibitors

Exhibits will be in the Varenna & Cernobbio. Opening at 8:00 AM, Tuesday, March 28 and closing at 4:00 PM, Wednesday, March 29.

Tutorials

Monday, March 26

08:30 - 10:30
System-Level Considerations in Inertial Sensor Performance
Room: Bassanini

Instructor: Professor Michael Braasch, *Ohio University*

Abstract: Most inertial navigation systems operate at three basic task-rates: high-speed, medium-speed and low-speed. High-speed tasks include formation and compensation of the raw delta-Vs and delta-thetas. Medium-speed tasks include attitude determination and velocity update. Low-speed tasks include position update and gravity calculation. Most inertial sensor designers concentrate their efforts in the high-speed task arena. Once the measurements have been formed and compensated, they are sent off to the systems and software engineers. This tutorial provides an overview of those 'downstream' tasks and focuses particularly on the long-term impact of sensor errors on inertial navigation system performance. Key error characteristics such as the Schuler, Foucault and Diurnal oscillations will be discussed. Which is more important? Gyro bias or accel bias? The answer is that it depends on the length of the mission! We will go through the details as well as highlight the criticality of additional performance metrics such as scale factor error, noise, data rate and data latency.

11:00 – 13:00
Non-GPS Aiding of INS
Room: Bassanini

Instructor: Professor Kai Bongs, *University of Birmingham*

Abstract: This tutorial will introduce atom interferometry for inertial sensing and for timekeeping. Atom interferometers have been first demonstrated 25 years ago and are now being developed in several places worldwide in to mobile systems with potential for real world applications. They offer precision measurements of rotation and acceleration. A key feature is the potential for operation with negligible drift and very linear scale factor. The tutorial will provide an overview of current developments and an outlook into future applications in navigation.

Tutorials

14:15 - 16:15
Modeling of offset and offset drift sources in AM/FM inertial sensors
Room: Bassanini

Instructor: Dr.Alessandro Tocchio, *STMicroelectronics*

Abstract: This tutorial will focus on the main contributors affecting MEMS inertial sensors performance in terms of accuracy. This parameter is of paramount importance in order to enable new markets and applications such as augmented and mixed reality, pedestrian or indoor navigation, etc. In particular, starting from the basic working principles of MEMS AM gyroscopes and a MEMS AM accelerometer based on capacitive sensing technique, the main phenomena affecting Zero-rate Level (ZRL) and Zero-G offset (ZGO) accuracy will be introduced. The origins of these phenomena and how they influence both the mechanical and the electrical world will be tackled analytically, and the approaches used to simulate them will be described.

Invited Speakers

Tuesday, March 27
09:00 - 09:30
I1: Invited Talk
Room: Bassanini

How high-volume MEMS device manufacturers can meet the requirements of different markets
Dr. Andrea Onetti, STMicroelectronics

Abstract:
ST was at the forefront in bringing MEMS technology to the high volume consumer market. Today the Internet of Things and Smart Driving trends are creating opportunities to make existing and new devices and applications smarter through the use of intelligent connected sensing technologies. This applies to factories and workplaces, cities, homes, vehicles and all the devices that can be found there.

The latest generations of MEMS products and technologies are developed to meet the needs of consumer applications while also targeting emerging automotive and industrial applications. Targeting different markets requires manufacturers to supply sensors with different characteristics but built on the same technology platforms. One key characteristic that differs by market is the accuracy the sensor is required to meet while another key characteristic is the combination of sensing functions that a device needs to have.

This talk will address how MEMS device manufacturers can meet the varied requirements of different markets while building on the high-volume manufacturing capabilities that are already in place for the consumer industry

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Wednesday, March 28
09:00 - 09:30
I2: Invited Talk
Room: Bassanini

Sub-femto-g free-fall with LISA Pathfinder
Stefano Vitale, University of Trento, Istituto Nazionale di Fisica Nucleare, and Agenzia Spaziale Italiana, Italy

Abstract:
The talk will briefly review the concept of a space-borne gravitational wave (GW) detector, and of its needs of pure inertial motion (geodesic motion) of reference test-masses. It will discuss then the sub-femto-g performance demonstrated by LISA Pathfinder, ESA's precursor to the LISA GW detector, and its impact on LISA and on the field of gravitational missions at large.

Invited Speakers

Wednesday, March 28
14:00 – 14:30
I3: Invited Talk
Room: Bassanini

The Machine of Bohnenberger: Inertial Link between Astronomy, Navigation, and Geodesy

Jörg F. Wagner, University of Stuttgart

Abstract:
The "Machine of Bohnenberger" is considered to be the first gyro with cardanic suspension. As this apparatus forms the precursor of Foucault's Gyroscope of 1852, it rates as the ancestor of all gyroscopic instruments. Its inventor, Johann Gottlieb Friedrich Bohnenberger (1765-1831), was a professor of physics, mathematics, and astronomy at the University of Tübingen, Germany, as well as the scientific head-surveying officer of the early Kingdom of Württemberg. Being the direct counterpart of C.F. Gauß in south-west Germany, he made major contributions to introducing modern geodesy in Germany; and besides his Machine, he designed also other various physical instruments. The paper gives an overview over the initial dissemination and the further development of the Machine of Bohnenberger and outlines Bohnenberger's scientific work and life.

Thursday, March 29
09:00 - 09:30
I4: Invited Talk
Room: Bassanini

HRG by SAFRAN, the game-changing technology

Fabrice Delhaye, Safran Electronics & Defense

Abstract:
Whereas the world inertial navigation community was wondering, for decades, if FOG would ultimately replace RLG, Safran is demonstrating with its HRG than technology prospective is not such easy game. With its HRG, Safran is proving that the HRG innovative approach is a real game changer in high end navigation. This paper sums up the overall principles of HRG, how it works and its intrinsic properties. Current applications of HRG are described to illustrate how HRG benefits are capitalized in valued-added products. More prospective aspects of the HRG are also addressed with the latest tests results of performance limits exploration.

Monday, March 26

07:00 - 16:00
Tutorial Registration
Room: Bassanini Foyer

08:30 - 10:30
Tutorial 1: System-Level Considerations in Inertial Sensor Performance
Instructor: Professor Michael Braach, *Ohio University*
Room: Bassanini
Session Chair: Michael Larsen, *Northrop Grumman, USA*

10:30 - 11:00
Coffee Break
Room: Bassanini Foyer

11:00 – 13:00
Tutorial 2: Atom Interferometer Inertial Sensors
Instructor: Professor Kai Bongs, *University of Birmingham*
Room: Bassanini
Session Chair: Michael Larsen, *Northrop Grumman, USA*

13:00 - 14:15
Lunch
Room: Restaurant La Cascata

14:15 – 16:15
Tutorial 3: Modeling of offset and offset drift sources in AM/FM inertial sensors
Instructor: Dr. Alessandro Tocchio
Room: Bassanini
Session Chair: Michael Larsen, *Northrop Grumman, USA*

18:00 - 20:00
Welcome Reception
Room: *Location to be announced*

All attendees are invited to the Welcome Reception for drinks and light hors d'oeuvres.

Tuesday, March 27

08:00 - 18:00
Registration
Room: Bassanini Foyer

08:45 - 09:15
Opening Remarks
Andrei Shkel, 2018 General Chair
Room: Bassanini
Session Chair: Andrei Shkel, *University of California, Irvine, USA*

09:15 - 09:45
I1: Invited Talk: Dr.Andrea Onetti, *STMicroelectronics*
Room: Bassanini
Session Chair: Andrei Shkel, *University of California, Irvine, USA*

How high-volume MEMS device manufacturers can meet the requirements of different markets
Dr. Andrea Onetti
 STMicroelectronics

09:45 - 10:45
T1: Instrumentation, Calibration and Testing
Room: Bassanini
Session Chairs: Giacomo Langfelder, *Politecnico di Milano, Italy*
                Rong Zhang, *Tsinghua University, China*

Rate table improvements in rate stability using look-up tables
André Niederberger, *Acutronic Switzerland Ltd., Switzerland*

A Micro Thermal and Stress Isolation Platform for Inertial Sensors
Donguk Max Yang[1], Khalil Najafi[1], David Lemmerhirt[2] , Jay Mitchell[2]
The University of Michigan[1], USA; ePack, Inc., USA[2]

Calibration and simultaneous measurement of MEMS gyroscope
Mikulas Jandak, *Honeywell International & TU Wien, Czech Republic*

10:45 - 11:05
Exhibitors' Highlights
Room: Varenna & Cernobbio
Session Chair: Alessandro Tocchio, *ST Microelectronics, Italy*

11:05 - 11:30
Coffee Break & Exhibits
Room: Varenna & Cernobbio

Tuesday, March 27

11:30 - 12:30
T2: INS, NAV-grade systems and AHRS
Room: Bassanini
Session Chairs: Michael Larsen, *Northrop Grumman, USA*
            Julien Auger, *Safran Electronics & Defense, France*

Compact Atomic Magnetometer for Global Navigation (NAV-CAM)
Michael Larsen, Michael Bulatowicz, Dennis Bevan, Philip Clark, Robert Griffith, Marta Luengo-Kovac, James Pavell
Northrop Grumman, USA

FOG based INS for satellite launcher application
Daniele Grifi, Roberto Senatore, Enrico Quatraro, Massimo Verola and Andrea Pizzarulli
Civitanavi Systems, Italy

Optimization of Gyroscope and Accelerometer/Magnetometer Portion of Basic Attitude and Heading Reference System
Simone Ludwig[1], Antonio R. Jimenez[2]
North Dakota State University, USA[1] ; Jimenez Centre for Automation and Robotics. CSIC-UPM, Spain[2]

12:30 - 14:00
Lunch
Room: Restaurant La Cascata

14:00 – 14:40
T3: Emerging Applications
Room: Bassanini
Session Chairs: Chris Painter, *Apple Inc., USA*
            Jae Yoong Cho, *University of Michigan, USA*

Monitoring Earthquake through MEMS Sensors (MEMS project) in the town of Acireale (Italy)
Antonino D'Alessandro, Salvatore Scudero, Giovanni Vitale, Roberto D'Anna, Luca Greco, Stefano Speciale, Giuseppe Passafiume
Istituto Nazionale di Geofisica e Vulcanologia, Italy

Towards Self-Navigating Cars using MEMS IMU: Challenges and Opportunities
Igor Prikhodko, Brock Bearss, Carey Merritt, Charles Blackmer
Analog Devices, USA

14:40 - 15:10
Lightning Round Presentations of the following Poster Session
Room: Bassanini, Bellagio

Tuesday, March 27

15:10 - 17:00
P1: Gyroscopes and Resonators
Room: Jasmine Foyer
Session Chairs: Alessandro Tocchio, *ST Microelectronics, Italy*
                    Tommi Piirainen, *Murata Electronics Oy, Finland*

This session will begin with "Lightning Round" Presentations (2 min X 16 posters) in Bassanini

P1-1: A dual-mass frequency-modulated (FM) pitch gyroscope: mechanical design and modelling
Valentina Zega[1], Claudia Comi[1], Patrick Fedeli[1], Attilio Frangi[1,] Alberto Corigliano[1], Paolo Minotti[1,] Giacomo Langfelder[1], Luca Falorni[2], Alessandro Tocchio[2]
Politecnico Milano, Italy[1]; STMicroelectronics, Italy[2]

P1-2: Quartz Cylindrical Resonators for Mid-Accuracy Coriolis Vibratory Gyroscopes
Mikhail Basarab[1], Boris Lunin[2], Evgeniy Chumankin[3], Alexey Yurin[1]
Bauman Moscow State Technical University, Russia[1]; Moscow State University n. a. Lomonosov, Russia[2] ;JSC ANPP TEMP-AVIA, Arzamas, Russia[3]

P1-3: Lateral Diffusion Doping of Epitaxial Silicon for Temperature Compensation of MEMS Resonators
Dongsuk D. Shin[1], David B. Heinz[1], Hyun-Keun Kwon[1], Yunhan Chen[2], Thomas Kenny[1]
Stanford University, USA[1]; Apple Incorporated, USA

P1-4: A control strategy for Coriolis and centrifugal effects reduction in an inertial system test equipment
Bernard Vau, Damien Ponceau, Mehdi Bussutil
Ixblue, France

P1-5: A comprehensive model of beams' anisoelasticity in MEMS gyroscopes with focus on the effect of axial non-vertical etching
Mohammad Izadi[1], Francesco Braghin[1], Daniele Giannini[1], Damiano Milani[1], Ferruccio Resta[1], Matteo Brunetto[2,] Luca Falorni[2], Gabriele Gattere[2], Luca Guerinoni[2], Carlo Valzasina[2]
Politecnico Milano, Italy[1]; STMicroelectronics, Italy[2]

P1-6: Theoretical model and experiments of glass reflow process in TGV for 3D wafer-level packaging
Yunbin Kuang, Jian Zhou, Wenyin Li, Hongjuan Cui
National University of Defense Technology, P.R. China

P1-7: Virtually Rotated MEMS Whole Angle Gyroscope using Independently Controlled CW/CCW Oscillations
Takashiro Tsukamoto, Shuji Tanaka
Tohoku University, Japan

P1-8: A system-level comparison of amplitude- vs frequency-modulation approaches exploited in low-power MEMS vibratory gyroscopes
Paolo Minotti[1], Giorgio Mussi[1], Giacomo Langfelder[1], Valentina Zega[1], Stefano Facchinetti[2], Alessandro Tocchio[2]
Politecnico Milano, Italy[1]; STMicroelectronics, Italy[2]

P1-9: Investigating the Impact of Resonant Cavity Design on Surface Acoustic Wave Gyroscope
Ashraf A Mahmoud, Mohamed Mahmoud, Tamal Mukherjee, Gianluca Piazza
Carnegie Mellon University, USA

Tuesday, March 27

P1-10: The 4th Harmonic Angular Drift Error in MEMS Vibratory Rate Integrating Gyroscopes
Zhongxu Hu, Barry Gallacher
Newcastle University, United Kingdom, Great Britain

P1-11: Resonance Frequency Control and Digital Correction for Capacitive MEMS Gyroscopes within electromechanical Bandpass Delta-Sigma-Modulators
Michael Maurer[1] , Stefan Rombach[1], Yiannos Manoli[2]
Hahn-Schickard, Germany[1]; Hahn-Schickard & IMTEK University of Freiburg, Germany[2]

P1-12: Modeling of temperature frequency-compensation of doped silicon MEMS resonator
Payman Rajai[1], Matthew Straeten[1], Jiewen Liu[1] , George Xereas[2] , Mohammed Jalal Ahamed[1]
University of Windsor, Canada[1] ;NXTSENS Microsystems Inc, Canada[2]

P1-13: Decoupled Rate and Quadrature Servos in a MEMS Gyroscope
David Hayner
Coherent Sensors, Inc., USA

P1-14: Predicting Height and Determining Mass of Foaming Agents for Glass Shell Resonatorsr
Bin Luo[1], Jintang Shang[1] , Zhaoxi Su[1],Ching-Ping Wong[2]
Southeast University, P.R. China[1];The Chinese University of Hong Kong, USA[2]

P1-15: Geometrical compensation of (100) single-crystal silicon mode-matched vibratory ring gyroscope
Shu Yunyi, Yoshikazu Hirai, Toshiyuki Tsuchiya, Osamu Tabata
Kyoto University, Japan

P1-16: Adaptative Feedthrough Cancelation in MEMS Gyroscopes In Reconfigurable IC+FPGA Platform
Joan Giner[1], Kazuo Ono[2]
GlobalFoundries,Singapore[1]; Hitachi, Ltd., Japan[2]

17:00 - 18:00
Open Posters
Room: Varenna & Cernobbio

All attendees are invited to the Open Poster Session for drinks and light hors d'oeuvres

Wednesday, March 28

08:00 - 17:00
Registration
Room: Bassanini Foyer

09:00 - 09:10
Welcome Comments, Day 2
Andrei Shkel, 2018 General Chair
Room: Bassanini
Session Chair: Giacomo Langfelder, *Politecnico di Milano, Italy*

09:10 - 09:40
I2: Invited Speaker: Stefano Vitale, *University of Trento, Istituto Nazionale di Fisica Nucleare, and Agenzia Spaziale Italiana*
Room: Bassanini
Session Chair: Giacomo Langfelder, *Politecnico di Milano, Italy*

Sub-femto-g free-fall with LISA Pathfinder
Stefano Vitale
University of Trento, Istituto Nazionale di Fisica Nucleare, and Agenzia Spaziale Italiana

09:40 - 10:40
T4: MEMS Accelerometers
Room: Bassanini
Session Chair: Diego Serrano, *Panasonic, USA*
       Takashiro Tsukamoto, *Tohoku University, Japan*

Single Resonator, Time-switched, low Offset Drift z-axis FM MEMS Accelerometer
Cristiano Marra[2], Filippo Ferrari[2], Giacomo Langfelder[2], Francesco Rizzini[1], Alessandro Tocchio[1]
ST Microelectronics[1]; Politecnico di Milano, Italy[2]

High-Density Wide-Range Digital Accelerometer Arrays with High Detection Resolution
Yemin Tang
University of Michigan Ann Arbor, USA

Electro-mechanical Chopping & Modulation of Acceleration: the Geometry-modulated Accelerometer
Cristiano Marra[2], Filippo Ferrari[2], Giacomo Langfelder[2], Francesco Rizzini[1], Alessandro Tocchio[1]
ST Microelectronics[1]; Politecnico di Milano, Italy[2]

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10:40 - 11:10
Lightning Round Presentations of the following Poster Session
Room: Bassanini

The session will begin "Lightning Round" Presentations (2 min X 12 posters) in Bassanini

11:10 - 13:00
P2: Accelerometers, Magnetometers, IMUs
Room: Bellagio
Session Chair: Igor Prikhodko, *Analog Devices Inc., USA*
                Johannes Classen, *Robert Bosch GmbH, Germany*

**Session will include Poster Discussion, Coffee Break & Exhibit Inspection

P2-1: Automated tuning of Kalman Filters
Wojciech Straszewski, Magdalena Drozdz, Hendrik Wouters
Fugro, The Netherlands

P2-2: Combined electronics and algorithm development for offset drift characterization in MEMS accelerometers
Federico Maspero[1] , Victor Fernandez López-Rey[2] , Loïc Joet[3] , Sébastien Hentz[3], Giacomo Langfelder[2]
University of Grenoble & CEA-Leti, France; Politecnico di Milano, Italy; CEA-Leti, France

P2-3: Simulation methods for generating reduced order models of MEMS sensors with geometric nonlinear drive motion
Martin Putnik[1], Stefano Cardanobile[1], Mateusz Sniegucki[1], Steven Kehrberg[1], Matthias Kuehnel[1] , Peter Degenfeld-Schonburg[1], Cristian Nagel[2] , Jan Mehner[3]
Robert Bosch GmbH, Germany[1] ;Robert Bosch GmbH Renningen, Germany[2] ;Technische Universität Chemnitz, Germany[3]

P2-4: Liquid Package Effects of Piezoresistive MEMS Accelerometer
Liu Xixiang[1],Libo Zhao[1] and Weile Jiang[1], Chen Jia[1],MingZhi Yu[1, 2],Jiang Zhuangde[2]
Xi'an Jiaotong University, P.R. China[1] ; State Key Laboratory for Manufacturing Systems Engineering, P.R. China[2]

P2-5: A Biologically-inspired Hair Accelerometer Based on Resonant Sensing
Bo Yang
Southeast University, P.R. China

P2-6: A 27μW MEMS Silicon Oscillating Accelerometer with 4-μg Bias Instability and 10-μg/√Hz Noise Density
Xi Wang[1], Guo Ming Xia[2], Yang Zhao[2], Jian Zhao[2], An Ping Qiu[2] , Yan Su[2] , Yong Ping Xu[3]
China University of Mining and Technology & National University of Singapore, P.R. China[1]; Nanjing University of Science and Technology, P.R. China[2]; National University of Singapore, Singapore[3]

P2-7: Attitude determination in dead reckoning navigation with reduced inertial support
Yakov Binder
Concern CSRI Elektropribor, Russia

P2-8: High-precision inertial measurement unit IMU-5000

Wednesday, March 28

Yuri Korkishko, Vyacheslav Fedorov, Viktor Prilutskiy, Vladimir Ponomarev, Igor Fedorov , Sergey Kostritskii, Ivan Morev, Dmitriy Obuhovich, Stanislav Prilutskiy, Aleksandr Zuev and Vasiliy Varnakov
RPC Optolink, Russia

P2-9: Experimental investigation of MEMS DRIE etching dimensional loss
Francesco Rizzini, Gabriele Gattere, Lorenzo Corso, Anna Alessandri, Francesco Tripodi , Ilaria Gelmi
ST Microelectronics, Italy

P2-10: In-flight magnetometer calibration in the projectile frame
Ronan Adam
French-German Research Institute of Saint-Louis, France

P2-11: Modeling of a vibrating MEMS magnetometer partially covered with a ferromagnetic thin film
Thomas Perrier[1, 2],Raphaël Levy[2], Patrick Kayser[2] , Béatrice Verlhac[2],Johan Moulin[1]
University Paris Sud, France[1]; ONERA, France[2]

P2-12: Auto-Zero Baseline Correction Circuit for MEMS Accelerometer Based Seismic Sensor
Panagiotis Ioakim, Iasonas Triantis
City University of London, United Kingdom (Great Britain)

13:00 - 14:30
Lunch
Room: Restaurant La Cascata

14:30 – 15:00
I3: Invited Speaker: Joerg F. Wagner, *University of Stuttgart, Germany*
Room: Bassanini
Session Chair: Joan Griner, *GlobalFoundries,Singapore*

The Machine of Bohnenberger: Inertial Link between Astronomy, Navigation, and Geodesy
Jörg F. Wagner
University of Stuttgart

15:00- 15:40
T5: IMUs
Room: Bassanini
Session Chair: Joan Griner, *GlobalFoundries,Singapore*
                    Ryan Supino, *Honeywell, USA*

Heteromagnetic Sensors Motion Parameters Of Moving Objects
Aleksandr Skripkin
TU - Saratov, Russia

Human Activity Recognition Method based on Inertial Sensor and Barometer
Lili Xie, Jun Tian, Genming Ding, Qian Zhao
Fujitsu Research & Development Center Co., LTD, P.R. China

15:40 - 16:10
Coffee Break & Exhibits
Room: Varenna & Cernobbio

16:10 - 17:10
T6: High-precision Gyroscopes and Resonators
Room: Bassanini
Session Chair: Alexander Trusov, *Northrop Grumman, USA*
              Randall Jaffe, *L-3 Communications, USA*

Symmetric Piezoelectric CVG with Digital Control
Anthony Challoner, Jeremy Popp, Peter Bond, Jose Beitia
InertialWave Inc., USA

High quality factor MEMS gyroscope with whole angle mode of operation
Mansoor Alam, Sina Askari, Mohammad H. Asadian, Andrei Shkel
University of California Irvine, USA

Simulation-Based Approach for Fabrication of Micro-Shell Resonators with Controllable Stiffness and Mass Distribution
Behrouz Shiari, Tal Nagourney, Sajal Singh, Jae Yoong Cho, Khalil Najafi
University of Michigan, USA

18:00 - 20:00
Banquet Dinner
Room: Restaurant La Cascata

Thursday, March 29

08:00 - 12:00
Registration
Room: Basanini Foyer

09:00 – 09:30
Welcome Comments & Awards Ceremony, Day 3
Andrei Shkel, 2018 General Chair
Room: Bassanini
Session Chairs: Michael Larsen, *Northrop Grumman, USA*

09:30 – 10:00
I4: Invited Talk: Fabrice Delhaye, Safran Electronics & Defense
Room: Jasmine 2
Session Chair: Andrei Shkel, *University of California, Irvine, USA*

HRG by SAFRAN, the game-changing technology
Fabrice Delhaye
Safran Electronics & Defense

10:00 - 11:00
T7: Fabrication, Phenomena and Modeling
Room: Bassanini
Session Chair: Olivier Le Traon, *ONERA, France*
                 Luca Coronato, *TDK-InvenSense Italy srl, Italy*

Investigation on precise frequency trimming of a micro shell resonator with T-shape masses using low-power femtosecond laser ablation
Kun Lu, Yan Shi, Dingbang Xiao, Zhanqiang Hou, Wei Li, Xuezhong Wu , Yulie Wu
National University of Defense Technology, P.R. China

Suppression of the resonance of vacuum-sealed accelerometers: a comparison of two different strategies
Bruno Fain, Frédéric Souchon, Audrey Berthelot, Romain Anciant, Philippe Robert, Guillaume Jourdan
CEA-LETI, France

A novel compensation method of damping asymmetry based on piezoelectric electrodes for cylindrical resonators
Jiangkun Sun, Yulie Wu, Xiang Xi, Yongmeng Zhang, Xuezhong Wu, Luozhen Qu
National University of Defense Technology, P.R. China

Thursday, March 29

Nuclear Magnetic Resonance Gyroscope (NMRG)
Michael Larsen[1], Dennis Bevan[1], James Pavell[1], Marta Luengo-Kovac[1], Michael Bulatowicz[1], Philip Clark[1], Robert Griffith[1], Julia Flicker[1], Ashely Rothballer[1] , Daryl Sakaida[1], Gordon Morrison[2], Juan Campero[2], Elliot Burke[2], Steven Estrella[2] , Brian Ehrsam[2]
Northrop Grumman, USA[1] ;Freedom Photonics, USA[2]

200mm High Performance Inertial Sensor Manufacturing Process
Stephane Martel[1], Francois Dion[1], Jeffrey DeNatale[2]
Teledyne DALSA Semiconductor, Canada[1]; Teledyne Scientific Company, USA[2]

Active Temperature Compensation of Thermal Accelerometer for Improved Stability
Kirsten Kaplan, Martin Winterkorn, Camille Everhart, Dongsuk D. Shin, Gary O'Brien, Fritz Prinz, Thomas Kenny
Stanford University, USA

Effect of Fabrication Imperfections on Energy Loss through Mechanical Mode Coupling
Daryosh Vatanparvar, Andrei M. Shkel
University of California, Irvine, United States

Shock behaviour of gyroscope based on gas thermal expansion
Guillaume Kock, Philippe Combette, Benoit Charlot, Alain Giani
University of Montpellier & Institute of Electronics & Systems (IES), France

**More information to be announced