

2008 IEEE/ION Position, Location and Navigation Symposium

**Monterey, CA
5-8 May 2008**

Pages 1-458



IEEE Catalog Number:
ISBN 13:

CFP08PLN-PRT
978-1-4244-1536-6

Table of Contents

GPS/INS Integration with Fault Detection and Exclusion in Shadowed Environments	1
<i>Benjamin J. Clark, David M. Bevly</i>	
Impact of Carrier to Noise Power Density, Platform Dynamics, and IMU Quality on Deeply Integrated Navigation.....	9
<i>Matthew Lashley, David M. Bevly, John Y. Hung</i>	
Performance of a Deeply Coupled Commercial Grade GPS/INS System from KVH and NovAtel Inc.	17
<i>Sandy Kennedy, Jim Rossi</i>	
An Evaluation of Nonlinear Filtering Algorithms for Integrating GNSS and Inertial Measurements.....	25
<i>Robin Schubert, Norman Mattern, Gerd Wanielik</i>	
Application of the Manifold-Constrained Unscented Kalman Filter	30
<i>Brian J. Sipos</i>	
Application of a Sigma-point Kalman Filter for Alignment of MEMS-IMU	44
<i>Qin Wang, Chris Rizos, Yong Li, Shiyi Li</i>	
Development of an Italian Low Cost GNSS/INS System Universally Suitable for Mobile Mapping	53
<i>Mattia De Agostino, Chiara Porporato</i>	
Efficient Gaussian Mixture Filter for Hybrid Positioning	60
<i>Simo Ali-Loytty</i>	
Issues in Wearable Biomechanical Inertial Sensor Systems	67
<i>William Dillard, Karthik Narayanan, Victor Trent, Michael Greene</i>	
Eyeball: An Inertial Helmet Mounted Cueing System	74
<i>J. Brandstaetter, I. Yatsiv, I. Kadosh, M. Lange, N. Maimon, M. Naroditzky, I. Rave, H. Rotstein</i>	
MEMS IMU for AHRS Applications	82
<i>W. Geiger, J. Bartholomeyczik, U. Breng, W. Gutmann, M. Hafen, E. Handrich, M. Huber, A. Jackle, U. Kempfer, H. Kopmann, J. Kunz, P. Leinfelder, R. Ohmberger, U. Probst, M. Ruf, G. Spahlinger, A. Rasch, J. Straub-Kalthoff, M. Stroda, K. Stumpf, C. Weber,</i>	
Gun Hard Inertial Measurement Unit Based on MEMS Capacitive Accelerometer and Rate Sensor	89
<i>Soheil Habibi, Stuart J Cooper, Jean-Michel Stauffer, Bertrand Dutoit</i>	
A Set of High Accuracy Low Cost Metallic Resonator CVG	95
<i>V.V. Chikovani, I. M. Okon, A.S. Barabashov, P. Tewksbury</i>	
Precision Navigation for UAVs, Mini-Munitions, and Handhelds through Application of Low Cost Accurate MEMS IMU/INS Technology	101
<i>Martin Tanenhaus, Dean Carhoun, Alex Holland</i>	
Accurate Positioning Using a Planar Pseudolite Array	110
<i>M. Pachter, J. Amt, J. Raquet</i>	
Hardware-In-The-Loop Testing of the NATO Standardisation Agreement 4572 Interface Using High Precision Navigation Equations.....	118
<i>R.J. Handley, R.F. Stokes, J. Stevenson, J.I.R. Owen</i>	
Determination of GPS RF Signal Strengths	126
<i>Glen Var Rosenbaum</i>	
Radio Interference Effects on Commercial GNSS Receivers Using Measured Data.....	136
<i>Thomas Jost, Christian Weber, Cecil Schandorf, Holmer Denks, Michael Meurer</i>	
A Unique Approach to WaveFront Calibration.....	145
<i>Eddie Thompson, Arnie Reed</i>	
Performance Assessment of Indoor Location Technologies.....	150
<i>Remi Challamel, Phillip Tomé, Dave Harmer, Stéphane Beauregard</i>	

Table of Contents

System and Algorithms for Accurate Indoor Tracking using Low-Cost Hardware.....	159
<i>Mark Hedley, David Humphrey, Phil Ho</i>	
SLL: Relations to Kohonen SOMs	167
<i>Bruno Betoni Parodi, Andrei Szabo, Henning Lenz, Joachim Bamberger, Joachim Horn</i>	
WI-FI BASED INDOOR LOCALIZATION AND TRACKING USING SIGMA-POINT KALMAN FILTERING METHODS.....	172
<i>Anindya S. Paul, Eric A. Wan</i>	
Feasibility of Gauss-Newton Method for Indoor Positioning.....	186
<i>Junlin Yan, Christian Tiberius, Giovanni Bellusci, Gerard Janssen</i>	
Robust Regression Applied to Ultrasound Location Systems.....	197
<i>Jose Carlos Prieto, Antonio R. Jimenez, Jorge I. Guevara, Joao L. Ealo, Fernando A. Seco, Javier O. Roa, Aikaterini D. Koutsou</i>	
Dynamic Estimation of Optimum Path Loss Model in a RSS Positioning System.....	205
<i>S. Mazuelas, F. A. Lago, D. González, A. Bahillo, J. Blas, P. Fernández, R. M. Lorenzo, E. J. Abril</i>	
Accurate Signal Strength Prediction based Positioning for Indoor WLAN Systems	211
<i>Anvar Narzullaev, Yongwan Park, Hoyoul Jung</i>	
Reconfigurable and Simultaneous Dual Band Galileo/GPS Front-end Receiver in 0.13μm RFCMOS.....	215
<i>A. Pizzarulli, G. Montagna, M. Pini, S. Salerno, N.Lofu, G. Sensalari</i>	
Dual-Band RF Receiver Chip-Set for Galileo/GPS applications.....	220
<i>M. Detratti, E. López, E.Pérez, R.Palacio, M. Lobeira</i>	
Multi System Navigation Receiver	229
<i>P. Kovár, F. Vejražka</i>	
A Low Complexity DSP Driven Analog Impairment Mitigation Scheme for Low-IF GNSS Receivers	234
<i>Alper Ucar, Ediz Cetin, Izzet Kale</i>	
Effect of Mutual Coupling on the Performance of GPS AJ Antennas.....	240
<i>Khadir A. Griffith, Inder J. Gupta</i>	
Performance of a Low-cost Field Re-configurable Real-time GPS/INS Integrated System in Urban Navigation.....	247
<i>Yong Li, Peter Mumford, Chris Rizos</i>	
GNSS Augmented with Precise Laser Tracking	255
<i>Matthias Sippel, Walter Kuntz, Leonard Reindl</i>	
A New Pre-processing Approach Against Array Uncertainty for GNSS.....	261
<i>Chung-Liang Chang, Jyh-Ching Juang</i>	
A multi-frequency filtering procedure for inertial navigation.....	267
<i>Mattia De Agostino</i>	
Modeling and Bounding Low Cost Inertial Sensor Errors	274
<i>Zhiqiang Xing, Demoz Gebre-Egziabher</i>	
Comparison of Low-Cost GPS/INS Sensors for Autonomous Vehicle Applications	285
<i>G. H. Elkaim, M. Lzarraga, L. Pedersen</i>	
MEMS Sensor and Integrated Navigation Technology for Precision Guidance.....	297
<i>Keith Sheard, Ian Scaysbrook, Derrick Cox</i>	
A General Theory for Inertial Navigator Error Modeling	304
<i>Kevin G. Blankinship</i>	

Table of Contents

The Soft Iron and Hard Iron Calibration Method using Extended Kalman Filter for Attitude and Heading Reference System 1-42.....	319
<i>Pengfei Guo, Haitao Qiu, Yunchun Yang, Zhang Ren</i>	
Optimal Linear Neuron Learning and Kalman Filter Based Backpropagation Neural Network for DGPS/INS Integration.....	327
<i>Faroog A. Ibrahim</i>	
Low-cost MEMS Sensor-based Attitude Determination System by Integration of Magnetometers and GPS: A Real-Data Test and Performance Evaluation.....	342
<i>Di Li, René Landry, Philippe Lavoie</i>	
INS/Baro Vertical Channel Performance Using Improved Pressure Altitude as a Reference	351
<i>Victor Chueh, Te-Chang Li, Robert Grethel</i>	
COMPACT, LOW-POWER CHIP-SCALE ATOMIC CLOCK.....	355
<i>J.F. Denatale, R.L. Borwick, C. Tsai, P.A. Stupar, Y. Lin, R.A. Newgard, R.W. Berquist, M. Zhu</i>	
Atomic Clock Error Modeling for GNSS Software Platform	359
<i>M. Y. Shin, C. Park, S. J. Lee</i>	
Using of Spirent GPS/Galileo HW Simulator for Timing Receiver Calibration.....	365
<i>U. Grunert, S. Thaelert, H. Denks, J. Furthner</i>	
Effects of time synchronization errors in GNSS-aided INS	370
<i>Isaac Skog, Peter Handel</i>	
Innovative Strategy for Vehicle Position Certification on the basis of GNSS reference time.....	377
<i>Andrea Tomatis, Diego Orgiazzi, Paolo Mulassano</i>	
Estimation of the Clock TIE State Space Model Using a Thinning Unbiased FIR Filtering Algorithm.....	384
<i>Yuriy S. Shmaliy, Oscar Ibarra-Manzano, Luis Arceo-Miquel, Luis Morales-Mendoza, Oleksandr Yu Shmaliy</i>	
A Holdover Algorithm for Applications in GPS-based Clock Synchronization.....	392
<i>Yuriy S. Shmaliy, Luis Arceo-Miquel, Oscar Ibarra-Manzano, Luis Morales-Mendoza, Oleksandr Yu Shmaliy, Jonny Zavala De Paz, Jos Miguel Moreno-Reyes</i>	
WAAS Measurement Processing; Current Design and Potential Improvements.....	400
<i>Karl Shallberg, Fang Sheng</i>	
Test Results for the WAAS Signal Quality Monitor	410
<i>Po-Hsin Hsu, Timothy Chiu, Yury Golubev</i>	
A Position Domain Relative RAIM Method	418
<i>Young C. Lee, Michael P. McLaughlin</i>	
Mitigation of Anomalous Ionosphere Threat to Enhance Utility of LAAS Differentially Corrected Positioning Service (DCPS).....	432
<i>Young Shin Park, Sam Pullen, Per Enge</i>	
Benefits of Tightly Coupled GPS/IRS for RNP Operations in Terrain Challenged Airports.....	441
<i>Jim McDonald, Joshua Kendrick</i>	
Flight Test Results of Loose Integration of Dual Airborne Laser Scanners (DALs)/INS.....	451
<i>Ananth K. Vadlamani, Maarten Uijt De Haag</i>	
Reduction of Ionosphere Divergence Error in GPS Code Measurement Smoothing by Use of a Non-Linear Process	459
<i>Shiladitya Sen, Jason Rife</i>	
LANDING: Added Assistance to Pilots on Small Aircraft Provided by EGNOS	468
<i>Joao Oliveira, Christian Tiberius</i>	
Evaluation of Automatically Steered Agricultural Vehicles	481
<i>Francisco Rovira-Más, Shufeng Han, John F. Reid</i>	

Table of Contents

Carrier-Phase Multipath Calibration in GPS-RTK Machine-Guidance Applications	487
<i>Luis Serrano, Don Kim, Richard B. Langley</i>	
A Low-Cost Hybrid SDINS/Multi-Camera Vision System for a Hand-held Tool Positioning	497
<i>N. Parnian, F. Golnaraghi</i>	
Bridging GPS Outages in the Agricultural Environment using Virtualite Measurements.....	505
<i>Anthony Cole, Jinling Wang, Chris Rizos, Andrew G. Dempster</i>	
On the Interference Mitigation Based on ADC Parameters Tuning.....	513
<i>Simone Savasta, Beatrice Motella, Fabio Dovis, Riccardo Lesca, Davide Margaria</i>	
Integration of Ultraviolet Sensor and X-ray Detector for Navigation Satellite Orbit Estimation.....	520
<i>Li Qiao, Jianye Liu, Guanglou Zheng, Zhi Xiong</i>	
Noise Analysis for X-ray Navigation Systems	528
<i>John Hanson, Suneel Sheikh, Paul Graven, John Collins</i>	
Online Time Delay Estimation of Pulsar Signals for Relative Navigation using Adaptive Filters	538
<i>Amir A. Emadzadeh, Cassio G. Lopes, Jason L. Speyer</i>	
Precise Orbit Determination for COSMIC Satellites Using GPS Data from Two onboard Antennas	544
<i>Da Kuang, Willy Bertiger, Shailen Desai, Bruce Haines, Byron Iijima, Thomas Meehan</i>	
Operational Use of GPS Navigation for Space Shuttle Entry.....	555
<i>John L. Goodman, Carolyn A. Propst</i>	
Tactical Underwater Navigation System (TUNS).....	568
<i>Randy Hartman, Wes Hawkinson, Kevin Sweeney</i>	
Initial Results from an In-Situ Environmental Monitoring Marine Mammal Tag	582
<i>Gabriel Hugh Elkaim, Eric B. Decker, Guy Olivery, Brent Wrightz</i>	
Robust and Efficient Terrain Navigation of Underwater Vehicles	593
<i>Ingemar Nygren</i>	
Submarine Navigation Applications of Atom Interferometry	603
<i>Hugh F. Rice, Vincent Benischek</i>	
Bose-Einstein Interferometry and its Applications to Precision Undersea Navigation.....	610
<i>Aleksandar Zatezalo, Vladan Vuleti, Paul Baker, T. Craig Poling</i>	
Optimal Sensor Configuration for Passive Position Estimation.....	621
<i>Jan Neering, Christian Fischer, Marc Bordier, Nadia Maizi</i>	
Coarse Alignment for Marine SINS Using Gravity in the Inertial Frame as a Reference.....	631
<i>Dongqing Gu, Naser El-Sheimy, Taher Hassan, Zainab Syed</i>	
On the Development of Guidance System Design for Ships Operating in Close Proximity.....	636
<i>Egil Pedersen, Etsuro Shimizu, Tor Einar Berg</i>	
Error Analysis for a Navigation Algorithm based on Optical-Flow and a Digital Terrain Map.....	642
<i>Oleg Kupervasser, Ronen Lerner, Ehud Rivlin, Hector Rotstein</i>	
Spatially Deconflicted Path Generation for Multiple UAVs in a Bounded Airspace.....	652
<i>M. I. Lizarraga, G. H. Elkaim</i>	
Latest Development of the TERPROM® Digital Terrain System (DTS)	658
<i>M Cowie, N Wilkinson, R Powlesland</i>	
Quaternion Attitude Estimation for Miniature Air Vehicles Using a Multiplicative Extended Kalman Filter.....	669
<i>James K. Hall, Nathan B. Knoebel, Timothy W. McLain</i>	
Localization and Perching Maneuver Tracking for a Morphing UAV.....	677
<i>A. Hurst, A. Wickenheiser, E. Garcia</i>	

Table of Contents

Precision Relative Navigation Solution for Autonomous Operations in Close Proximity	685
<i>Kevin Liu, Christopher Moore, Robert Buchler, Phil Bruner, Alex Fax, Jacob L. Hinchman, Ba T. Nguyen, David E. Nelson, Fred Ventrone, Brian R. Thorward</i>	
Adaptive Path Planning for a VTOL-UAV	691
<i>Oliver Meister, Natalie Frietsch, Christian Ascher, Gert F. Trommer</i>	
Cascaded Estimation Architecture for Integration of Foot-Mounted Inertial Sensors	699
<i>Bernhard Krach, Patrick Roberston</i>	
Use of a New Pedometric Dead Reckoning Module in GPS Denied Environments	707
<i>Tom Judd, Toan Vu</i>	
Multi-sensor Personal Navigator Supported by Adaptive Knowledge Based System: Performance Assessment	716
<i>S. Moafipoor, D.A. Grejner-Brzezinska, C. K. Toth</i>	
Indoor PDR Performance Enhancement using Minimal Map Information and Particle Filters	728
<i>Stephane Beauregard, Martin Klepal</i>	
Differential Barometry in Personal Navigation	735
<i>J. Parviainen, J. Kantola, J. Collin</i>	
Towards Operational Systems for Continuous Navigation of Rescue Teams	740
<i>Michael Angermann, Mohammed Khider, Patrick Robertson</i>	
Performance Enhancement of GNSS Positioning in Critical Scenarios by Wireless Communications Systems	746
<i>Christian Mensing, Stephan Sand</i>	
Optimal Data Fusion for Pedestrian Navigation based on UWB and MEMS	753
<i>V. Renaudin, B. Merminod, M. Kasser</i>	
WPI Precision Personnel Locator System: Inertial Navigation Supplementation	762
<i>V. Amendolare, D. Cyganski, R. J. Duckworth, S. Makarov, J. Coyne, H. Daempfling, B. Woodacre</i>	
Statistical Characterisation of the Indoor Pseudorange Error using Low Cost Receivers	770
<i>Thomas Jost, Patrick Robertson</i>	
Timing Error Suppression Scheme for CDMA Network Based Positioning System	776
<i>Sunmi Kim, Heedong Choi, Juhyun Park, Yongwan Park</i>	
Backing up GPS in Urban Areas using a Scanning Laser	781
<i>Maged Jabbour, Philippe Bonnifait</i>	
Tight Coupling of GPS, Laser Scanner, and Inertial Measurements for Navigation in Urban Environments	787
<i>Andrey Soloviev</i>	
Simultaneous Probabilistic Localization and Learning: A New Algorithm for Online Learning	802
<i>Bruno Betoni Parodi, Andrei Szabo, Joachim Bamberger, Joachim Horn</i>	
An Evaluation of the Tight Optical Integration (TOI) Algorithm Sensitivity to Inertial and Camera Errors	809
<i>S. Bhattacharya, T. Arthur, M. Uijt De Haag, Z. Zhu, K. Scheff</i>	
Sensor Fusion for GNSS Denied Navigation	817
<i>Kailash Krishnaswamy, Sara Susca, Rob McCroskey, Pete Seiler, Jan Lukas, Ondrej Kotaba, Vibhor Bageshwar, Subhabrata Ganguli</i>	
An Algorithm for the Extraction of Static Features from 3D Flash LADAR Datasets: Supporting Navigation in GPS Challenged Environments	828
<i>J.N. Markiel, D. Grejner-Brzezinska, C. Toth</i>	
Implementation of a Flash-LADAR Aided Inertial Navigator	836
<i>M. Uijt De Haag, D. Venable, A. Soloviev</i>	

Table of Contents

Demonstration of Tight Optical Integration (TOI) Algorithm Using Field Data.....	844
<i>T. Arthur, Z. Zhu, S. Bhattacharya, K. Johnson, K. Scheff</i>	
Performance Analysis and Integrity Aspects of Tight Optical Integration (TOI) with GPS.....	852
<i>Maarten Uijt De Haag, Zhen Zhu, Tom Arthur</i>	
Terrain-Based Navigation: Trajectory Recovery from LiDAR Data.....	860
<i>Charles Toth, Dorota A. Grejner-Brzezinska, Young-Jin Lee</i>	
A Marginalized Particle Filter Approach to an Integrated INS/TAP System.....	866
<i>T. Hektor, H. Karlsson, P-J. Nordlund</i>	
Low Cost, Low Power Structured Light Based Obstacle Detection.....	871
<i>David Ilstrup, Gabriel Hugh Elkaim</i>	
Navigation Aiding Using On-Line Mosaicking	879
<i>Vadim Indelman, Pini Gurfil, Ehud Rivlin, Hector Rotsteinx</i>	
Integrity in Urban and Road Environments and its use in Liability Critical Applications	892
<i>J. Cosmen-Schortmann, Gmv M. Azaola-Sáenz, Gmv M.A. Martínez-OlaGüe, Gmv M. Toledo-López</i>	
Hybrid Extended Particle Filter (HEPF) for Integrated Civilian Navigation System.....	904
<i>P. Aggarwal, Z. Syed, Dr N.El-Sheimy</i>	
Novel Geolocation Technology for Geophysical Sensors for Detection and Discrimination of Unexploded Ordnance	913
<i>Dorota A. Grejner-Brzezinska, Charles Toth, Hongxing Sun, Xiankun Wang, Chris Rizos</i>	
Image landmark based positioning in road safety applications using high accurate maps.....	928
<i>Norman Mattern, Robin Schubert, Gerd Wanielik</i>	
An Integrated Reduced Inertial Sensor System - RISS / GPS for Land Vehicle	934
<i>Umar Iqbal, Aime Francis Okou, Aboelmagd Noureldin</i>	
Trajectory Duplication Using Relative Position Information For Automated Ground Vehicle Convoys	942
<i>William Travis, David M. Bevly</i>	
Low cost mobile mapping systems: an Italian experience.....	953
<i>Marco Piras, Alberto Cina, Andrea Lingua</i>	
Modeling and Simulation of a Terrain Aided Inertial Navigation Algorithm for Land Vehicles	966
<i>Tolga Sönmez, Haluk Erdem Bingöl</i>	
Redundant MEMS-IMU integrated with GPS for Performance Assessment in Sports.....	973
<i>Adrian Waegli, Stéphane Guerrier, Jan Skaloud</i>	
Relative Position of UGVs in Constrained Environments using Low Cost IMU and GPS Augmented with Ultrasonic Sensors	982
<i>Harold P. Henderson, David M. Bevly</i>	
Teaming of an UGV with a VTOL-UAV in Urban Environments.....	991
<i>N. Frietsch, O. Meister, C. Schlaile, G. F. Trommer</i>	
Enhancement of Global Vehicle Localization using Navigable Road Maps and Dead-Reckoning	999
<i>Clément Fouque, Philippe Bonnifait, David Bétaille</i>	
Heading Accuracy Improvement of MEMS IMU/DGPS Integrated Navigation System for Land Vehicle.....	1005
<i>Dongqing Gu, Naser El-Sheimy</i>	
Tightly-Coupled GPS / INS System Design for Autonomous Urban Navigation.....	1010
<i>Isaac Miller, Brian Schimpf, Mark Campbell, Jan Leyssens</i>	
Frequency Domain Block Filtering GNSS Receivers	1024
<i>Harri Saarnisaari, Ebrahim Karami</i>	

Table of Contents

Assessment on Low Complexity C/No Estimators Based on M-PSK Signal Model for GNSS Receivers	1032
<i>Emanuela Falletti, Marco Pini, Letizia Lo Presti, Davide Margaria</i>	
Robust DLL Discrimination Functions Normalization in GNSS Receivers	1038
<i>Daniele Borio, Maurizio Fantino, Letizia Lo Presti, Marco Pini</i>	
GNSS Receiver Rotation Tracking Loop Design for Spinning Vehicles	1046
<i>Jeong Won Kim, Mi Young Shin, Liu Melin, Dong-Hwan Hwang, Sang Jeong Lee</i>	
Acquisition systems for GNSS signals with the same code and bit rates	1052
<i>Letizia Lo Presti, Maurizio Fantino, Paolo Mulassano, Xuefen Zhu</i>	
On Co-Existence of In-Band UWB-OFDM and GPS Signals: Tracking Performance Analysis	1061
<i>Dmitriy Garmatyuk, Y. Jade Morton, Xiaolei Mao</i>	
The Adaptive Combined Receiver Tracking Filter Design for High Dynamic Situations	1068
<i>Kwang-Hoon Kim, Gyu-In Jee, Jong-Hwa Song, Sangkyung Sung</i>	
Performance Analysis of MBOC, AltBOC and BOC Modulations in Terms of Multipath Effects on the Carrier Tracking Loop within GNSS Receivers	1075
<i>Maurizio Fantino, Gianluca Marucco, Paolo Mulassano, Marco Pini</i>	
GNSS Performance Enhancement in Urban Environment Based on Pseudo-range Error Model	1083
<i>N. Viandier, D. F. Nahimana, J. Marais, E. Duflos</i>	
Utilizing Multipath Reflections in Deeply Integrated GPS/INS Architecture for Navigation in Urban Environments	1089
<i>Andrey Soloviev, Frank Van Graas</i>	
Low Complexity Ultra-Wideband Ranging in Indoor Multipath Environments	1100
<i>Giovanni Bellusci, Gerard J. M. Janssen, Junlin Yan, Christian C. J. M. Tiberius</i>	
Indoor Geolocation Using RF Multipath With Probabilistic Data Association	1108
<i>D.E. Gustafson, M.S. Bottkol, J.R. Parry, J.M. Elwell</i>	
Spectral Analysis and Low-Frequency Multipath Mitigation for Kinematic Applications	1119
<i>E. M. De Souza, J.F.G. Monico, W.G.C. Polezel, A. Pagamisse</i>	
Complexity Reduced Multipath Mitigation in GNSS with the GRANADA Bit-True Software Receiver	1124
<i>Ingmar Groh, Stephan Sand, Christian Mensing</i>	
An MCMC Algorithm for BOC and AltBOC Signaling Acquisition in Multipath Environments	1130
<i>Fadoua Brahim, Thierry Chonavel</i>	
Geometry Extra-Redundant Almost Fixed Solutions: A High Integrity Approach for Carrier Phase Ambiguity Resolution for High Accuracy Relative Navigation	1139
<i>Shuwu Wu, Stephen R. Peck, Robert M. Fries, Gary A. McGraw</i>	
A New Approach for Calculating Position Domain Integrity Risk for Cycle Resolution in Carrier Phase Navigation Systems	1154
<i>Samer Khanafseh, BorIs Pervan</i>	
Precise Point Positioning with multiple Galileo frequencies	1163
<i>Patrick Henkel, Christoph Gunther</i>	
Precise Kinematic Positioning Using Single Frequency GPS Receivers and an Integer Ambiguity Constraint	1171
<i>James Pinchin, Chris Hide, David Park, Xiaoyi Chen</i>	
The Effect of the Antenna Phase Response on the Ambiguity Resolution	1177
<i>Lauri Wirola, Ilkka Kontola, Jari Syrjärinne</i>	
Performance Analysis of an Alternative Technique for Relative Positioning by GPS	1187
<i>A. El-Mowafy</i>	

Table of Contents

Enhanced Loran: Real-time Maritime Trials	1195
<i>S. Basker, P. Williams, M. Bransby, D. Last, G. Offermans, A. Helwig</i>	
Loran Phase Codes, Revisited.....	1203
<i>Peter F. Swaszek, Richard Hartnett</i>	
H-field Antenna Considerations for eLoran Aviation Applications.....	1213
<i>Chris G. Bartone, Mitchell J. Narins, Wouter Pelgrum, Robert Lilley, Luyi Chen</i>	
A Measure of Loran Location-based Information.....	1227
<i>Di Qiu, Sherman Lo, Per Enge</i>	
Location Determination in WiBro (Wireless Broadband) System	1235
<i>Jin Ik Kim, Jang Gyu Lee, Gyu In Gee</i>	
Enhanced GPS: The tight integration of received cellular timing signals and GNSS receivers for ubiquitous positioning	1241
<i>Robert W. Rowe, Peter J. Duffett-Smith, Murray R. Jarvis, Nicolas G. Graube</i>	
Satellite Selection for Multi-Constellation.....	1249
<i>Zhang Miaoyan, Zhang Jun, Qin Yong</i>	
Cycle-slip Detection, Determination, and Validation for Triple-Frequency GPS.....	1256
<i>Zhen Dai, Stefan Knedlik, Otmar Loffeld</i>	
A Theoretical Performance Analysis of the Modernized GPS Signals.....	1263
<i>U. Engel</i>	
Study of Signal Combining Methodologies for Future GPS Flexible Navigation Payload (Part II)	1275
<i>T. Fan, V. S. Lin, G. H. Wang, P. A. Dafesh</i>	
Recommendations on Digital Distortion Requirements for the Civil GPS Signals.....	1286
<i>Christopher J. Hegarty, A. J. Van Dierendonck</i>	
Precise Observation of BOC Modulated Signals in the Presence of Noise and Specular Multipath.....	1296
<i>R. Benjamin Harris, E. Glenn Lightsey</i>	
Implementation Approaches of Adaptive Algorithms for Crosscorrelation Effect Compensation in Weak Signal Conditions.....	1311
<i>Catalin Lacatus, David Akopian, Mehdi Shadaram</i>	
An ANOVA-Based GPS Multipath Detection Algorithm Using Multi-Channel Software Receivers	1316
<i>M. T. Brenneman, Y. T. Morton, Q. Zhou</i>	
Positioning with Punctured GPS	1324
<i>Peter J. Duffett-Smith, Anthony R. Pratt</i>	
GNSS Signal Acquisition and Tracking Using a Parallel Approach.....	1332
<i>Chih-Cheng Sun, Shau-Shiun Jan</i>	
Post-Correlation Semi-Coherent Integration For High-Dynamic and Weak GPS Signal Acquisition	1341
<i>Chun Yang, Thao Nguyen, Erik Blasch, Mikel Miller</i>	
An Assisted High-Sensitivity Acquisition Technique for GPS Indoor Positioning	1350
<i>Fabio Dovis, Riccardo Lesca, Davide Margaria, Gianluca Boiero, Giorgio Ghinamo</i>	
Acquisition of Weak GNSS Signals Using a New Block Averaging Pre-Processing	1362
<i>Mohamed Sahmoudi, Moeness G. Amin, Rene Landry</i>	