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GISMO: A Smart Sensor to Mitigate and Monitor Ionospheric Effects
L. Siniscalco, N. Pastori, A. Zin, A. Emmanuele, A. Ferrario, C. Manno, B. Forte

2263 - 2272

D1: UAV Navigation Technology and Algorithms (Invited Speakers)

Relative Target Estimation using a Cascade of Extended Kalman Filters
Jerel Nielsen and Randal W. Beard

2273 - 2289

Precise RTK Positioning with GNSS, INS, Barometer and Vision
Patrick Henkel, Alexander Blum, Christoph Günther

2290 - 2303

Navigating without a Navigator – A Review of Positioning and Navigation Technologies for UAVs
Terry Moore

2304 - 2320

Utilization of UAV Autopilots in Vision-Based Alternative Navigation
Robert C. Leishman, Jeremy Gray, and John Raquet

2321 - 2331

Positioning Autonomy of a Fixed-Wing UAV through VDM/INS Integration with Experimental Results
Mehran Khaghani and Jan Skaloud Best Presentation Peer Reviewed

2332 - 2337

D2: Advanced Integrity Algorithms for Safe Autonomous Operation

Advanced RAIM Performance Sensitivity to Deviation of ISM Parameter Values
Young C. Lee and Brian Bian Peer Reviewed

2338 - 2358

Feasibility of Fault Exclusion Related to Advanced RAIM for GNSS Spoofing Detection
Heidi Kuusniemi, Juan Blanch, Yu-Hsuan Chen, Sherman Lo, Anna Innac, Giorgia

Ferrara, Salomon Honkala , M. Zahidul H. Bhuiyan, Sarang Thombre, Stefan Söderholm, Todd Walter, R. Eric Phelts, Per Enge Peer Reviewed

2359 - 2370

Methods of Integrity Risk Computation for ARAIM FDE
Carl Milner, Eugene Bang, Christophe Macabiau, Philippe Estival

2371 - 2387

Chips-Message Robust Authentication (Chimera) for GPS Civilian Signals
Jon M. Anderson, Katherine L. Carroll, Nathan P. DeVilbiss, James T. Gillis, Joanna C. Hinks, Brady W. O'Hanlon, Joseph J. Rushanan, Logan Scott, Renee A. Yazdi Best Presentation

2388 - 2416

Sequential Change Detection for Next-Generation RAIM Algorithms
Daniel Egea-Roca, Gonzalo Seco-Granados, and José A. López-Salcedo

2417 - 2427

Integrity Measures in Direct-positioning
Pau Closas, Adrià Gusi-Amigó, Juan Blanch

2428 - 2435

A New Look at Bounding Integrity Risk in the Presence of Time-Correlated Errors
Steven E. Langel, Mathieu Joerger, Samer M. Khanafseh and Boris S. Pervan

2436 - 2451

A Framework for Regional GNSS Situational Awareness
Kirsten L. Strandjord and Penina Axelrad

2452 - 2466

Derivation of Spherical Overbounding for Quadratic Integrity Monitors with Non Gaussian Random Inputs
Jason H. Rife Peer Reviewed

2467 - 2476

ARAIM with Weighted False Alarm Allocation
Jakub Skalicky, Martin Orejas and Ute Ziegler Peer Reviewed

2477 - 2481

Integrity Monitoring Improvement by Exploiting the Raw GNSS Signals
Christophe Charbonnieras, François Vincent, Jonathan Israel, Guillaume Carrie, Marion Aubault-Roudier Peer Reviewed

2482 - 2500

D3: Robust Autonomy Innovations for Robotic Vehicles

A Distributed Cooperative UAV Swarm Localization System: Development and Analysis
Salil Goel Student Paper Award Peer Reviewed

2501 - 2518

Distributed Signals of Opportunity Aided Inertial Navigation with Intermittent Communication
Joshua J. Morales and Zaher M. Kassas Best Presentation Peer Reviewed

2519 - 2530

Planar Pose Estimation using a Camera and Single-Station Ranging Measurements
Chen Zhu, Gabriele Giorgi, Christoph Günther Peer Reviewed

2531 - 2540

Evaluation of Hybrid Positioning Scenarios for Autonomous Vehicle Applications
José A. del Peral-Rosado, Roger Estatuet-Castillo, José A. López-Salcedo, Gonzalo Seco-Granados, Zdenek Chaloupka, Lionel Ries, José A. García-Molina Peer Reviewed

2541 - 2553

Evaluation of Relative Clock Stability in Cellular Networks
Joe J. Khalife and Zaher M. Kassas

2554 - 2559

Opportunistic Landmark Registration for Long Distance Relative Path Following
Dan Pierce, Scott Martin, and David M. Bevly Peer Reviewed

2560 - 2573

Skyline-based Positioning in Urban Canyons Using a Narrow FOV Upward-Facing Camera
Paul Verlaine Gakne and Kyle O'Keefe Peer Reviewed

2574 - 2586

Ultra-Tightly Coupled GNSS/INS for Small UAVs
Daniel Olesen, Jakob Jakobsen and Per Knudsen Peer Reviewed

2587 - 2602

Graphical Approach to Representation and Inference in Multi-sensor State Estimation
Xin Zhang and Xingqun Zhan

2603 - 2611

D4: PANEL: Hostile Micro Aerial Vehicles (MAV) Threats: Detection and Countermeasures

Hostile MAVs – An Introduction to Threats and Countermeasures
Michael Meurer

2612 - 2647

Hostile MAVs: Resiliency Considerations in the Transportation Sector
Andrew Hansen

2648 - 2663

Counter-UAV Challenges: Is GNSS Spoofing Effective?
Todd Humphreys

2664 - 2690

D5: PANEL: The Future of GNSS in Civil Aviation

Future of GNSS in Civil Aviation
Ken Alexander

2691 - 2722

Future of GNSS in Civil Aviation
Tim Murphy

2723 - 2741

The Future of GNSS in Civil Aviation: Opportunities and Challenges
Francisco Salabert

2742 - 2757

D6: GNSS Interference Detection and Localization Algorithms

Development of a Three-Element Beam Steering Antenna for Bearing Determination Onboard a UAV Capable of GNSS RFI Localization
Adrien Perkins, Yu-Hsuan Chen, Wei Lee, Sherman Lo, Per Enge

2758 - 2769

Frequency Tracking and Mitigation Method of Multiple GNSS Interferences Using an Adaptive Linear Kalman Notch Filter
Sun Young Kim, Chang Ho Kang, and Chan Gook Park Peer Reviewed

2770 - 2779

GPS Spoofer Localization for PMUs using Multi-Receiver Direct Time Estimation
Sriramya Bhamidipati and Grace Xingxin Gao Best Presentation

2780 - 2784

A Beamforming Algorithm Based on the Uncertainty Set of the Space-Frequency Vector
Chao Ren, Yongxiang Zheng, Gang Hu

2785 - 2794

Interference Detection and Characterization with an Array based GNSS Receiver using Conformal Antennas in Maritime Environments
A. Konovaltsev, S. Caizzone, K. Yinusa, M. Sgammini, E. Pérez Marcos, M. Appel, M. Cuntz, W. Elmarissi, M. Meurer

2795 - 2811

Simultaneous Localization of Multiple GNSS Interference Sources via Neural Networks
David Besson Peer Reviewed

2812 - 2829

A Method for GNSS Real-time Multipath Mitigation Based on CEEMD-HT Algorithm
Dengao Li, Ya Liu and Jumin Zhao Peer Reviewed

2830 - 2837

Using Range Information to Detect Spoofing in Platoons of Vehicles
Peter F. Swaszek, Richard J. Hartnett, Kelly C. Seals

2838 - 2853

RAIM and SBAS based Detection of GNSS Spoofing by Timing and Content Consistency Rules
Guoyu Fu, Tyler Holmes, Colton Riedel and Jyh-Charn Liu Peer Reviewed

2854 - 2868

E1: Multisensor Navigation in Challenging Environments 1

Cooperative Localization in Indoor Environments Using Constrained Differential Wi-Fi and UWB Measurements
Guenther Retscher, Hannes Hofer, Allison Kealy, Vassilis Gikas, Franz Obex Peer Reviewed

2869 - 2882

AoD-based Positioning for Wi-Fi OFDM Receivers
Nir Dvorecki, Ofer Bar-Shalom, and Yuval Amizur Peer Reviewed

2883 - 2893

WiFi Based Robust Positioning System in Large Scale and Weak Signal Environment
Beomju Shin, Boseon Yu, Jaewon Bang, Changdon Kee, Taikjin Lee

2894 - 2897

Navigation and Mapping with Loop Closure
Joakim Rydell and Erika Bilock

2898 - 2905

Robust Navigation In GNSS Degraded Environment Using Graph Optimization
Ryan M. Watson and Jason N. Gross Best Presentation Peer Reviewed

2906 - 2918

Covariance Estimation for GPS-LiDar Sensor Fusion for UAVs
Akshay Shetty and Grace Xingxin Gao Peer Reviewed

2919 - 2923

Railways Augmented Multisensor Positioning System
Alessandro Neri, Andrea Coluccia, Enrico De Marinis, Claudia Facchinetti, Paola Madonna, Michele Mascolo, Federica Pascucci, Pietro Salvatori, Luca Sfarzo, Alberto Tuozzi Peer Reviewed

2924 - 2943

Comparative Analysis of Magnetic-Based RISS using Different MEMS-Based Sensors
Ashraf Abosekeen, Aboelmagd Noureldin, Tashfeen Karamat, Michael J. Korenberg

2944 - 2959

A Joint DOA/TOF Estimation Technique for 3D Localization of user Equipment in an Indoor Multipath Environment
Umer Javed, Di He, Peilin Liu

2960 - 2972

Multi-sensor Fusion Algorithm Based on GPS/MEMS-IMU Tightly Coupled for Smartphone Navigation Application
Wei Liu, Bingcheng Liu and Xiao Chen

2973 - 2980

E2: Multisensor Navigation in Challenging Environments 2

Simultaneous Localization and Mapping using Terrestrial Multipath Signals, GNSS and Inertial Sensors
Christian Gentner, Robert Poehlmann, Markus Ulmschneider, Thomas Jost, and Armin Dammann Best Presentation Peer Reviewed

2981 - 2993

Enhancing Micro Air Vehicle Navigation in Dense Urban Areas using 3D Mapping Aided GNSS
Paul D. Groves and Mounir Adjrad, Jonathan Selbie

2994 - 3009

The Development of an Artificial Neural Networks Aided Image Localization Scheme for Indoor Navigation Applications with Floor Plans Built by Multi-platform Mobile Mapping Systems
Jhen-Kai Liao, Guang-Je Tsai Student Paper Award Peer Reviewed

3010 - 3027

A Computational Multivariate-based Technique for Inertial Sensor Calibration
Gaetan Bakalli, Ahmed Radi, Naser El-Sheimy, Roberto Molinari, Stéphane Guerrier Peer Reviewed

3028 - 3038

Approximate Maximum Likelihood Estimation Using a 3D GNSS Simulator for Positioning in MP/NLOS Conditions
Nabil Kbayer, Mohamed Sahmoudi, Héctor Ortega, Cédric Rouch Peer Reviewed

3039 - 3052

An Automatic Calibration Approach for the Stochastic Parameters of Inertial Sensors
Ahmed Radi, Gaetan Bakalli, Naser El-Sheimy, Stéphane Guerrier, Roberto Molinari Peer Reviewed

3053 - 3060

Advanced GPS-based Attitude Estimation Scheme for Various IMU Failure Scenarios of Low-Cost UAV
Heekwon No, Changdon Kee, Am Cho, Byungwoon Park

3061 - 3070

Signal and Data Structure for Navigation with a Terahertz Interferometer
John Scott Parker and Jason Rife Peer Reviewed

3071 - 3087

Comparisons of SR-UKF Family for a Visual-IMU Tightly-coupled System Based on Tri-focal Tensor Geometry
Maosong Wang, Wenqi Wu, Naser El-Sheimy

3088 - 3101

Robust Attitude Determination Using GNSS Multi Baseline Carrier Phase and IMU Sensor Fusion
Hiraku Nakamura, Hiroyuki Toda, Naomi Fujisawa, and Takuo Kashiwa

3102 - 3110

E3: PANEL: Assured Navigation and Timing

Assured PNT: How to Get There?
Grace Xingxin Gao

3111 - 3131

Assured Navigation and Timing
Todd Humphreys

3132 - 3155

PNT Assurance - Moving Towards Answers
Joseph Rushanan

3156 - 3166

“Trust, but Verify”
Logan Scott

3167 - 3190

Assured PNT
David W.A. Taylor

3191 - 3202

Assured Navigation for Aviation: Threats and Mitigations
Todd Walter

3203 - 3214

Thoughts from a GPS Non-expert: With Input from GPS Experts
Jesse Wodin

3215 - 3223

E4: Navigation Using Environmental Features

Bounding INS Positioning Errors with Magnetic-Field-Signatures in Railway Environments
Benjamin Siebler, Oliver Heirich, Stephan Sand Peer Reviewed

3224 - 3230

Onboard Train Localization with Track Signatures: Towards GNSS Redundancy
Oliver Heirich and Benjamin Siebler Best Presentation Peer Reviewed

3231 - 3237

Sound Based Positioning
David L. Weathers and John Raquet Peer Reviewed

3238 - 3252

Urban Positioning Accuracy Enhancement Utilizing 3D Buildings Model and Accelerated Ray Tracing Algorithm
Nesreen I. Ziedan

3253 - 3268

SIAM: Extruded Shapefile based Interference Avoidance and Mitigation for GNSS Navigation in Urban Canyons
Guoyu Fu, Colton Riedel, Tyler Holmes and Jyh-Charn Liu

3269 - 3284

WiFi and PDR Based Robust SLAM Implementation using Surface Correlation
Beomju Shin, Boseon Yu, Jaewon Bang, Changdon Kee, Taikjin Lee

3285 - 3288

Integrated IMU/Image Collaborative Navigation for Indoor Environments
Lin Zhang, Haowei Xu, Baowang Lian, Charles K. Toth, Dorota A. Grejner-Brzezinska
Peer Reviewed

3289 - 3300

Visual Odometry with Dynamic Object Detection by Complementary Integration of Optical Flows and Pattern Recognition
Kojiro Takeyama, Takashi Machida, Yoshiko Kojima, Nobuaki Kubo

3301 - 3310

A Sparse Direct Visual-Inertial Method for Pedestrian Navigation Using Smartphone Sensors
Zhaosheng Wang, Jiuchao Qian, Yuze Wang, Peinlin Liu, Wenxian Yu Peer Reviewed

3311 - 3320

Research and Performance Analysis of Tightly Coupled Vision, INS and GNSS System for Land Vehicle Applications
Muhammad Adeel, Zheng Gong, Peilin Liu, Yuze Wang, Xin Chen

3321 - 3330

A Magnetic-Aided PDR Localization Method Based on the Hidden Markov Model
Yi Lu, Dongyan Wei, Hong Yuan

3331 - 3339

Multisensor Concept for Autonomous Navigation of Unmanned Systems in GNSS-denied Environments
Mario Gäbel, Thomas Krüger, Stefan Nowak, Jan Meifarth, Ulf Bestmann

3340 - 3352

E5: Remote Sensing, Timing, and Clock Technology

Receiver-Level Robustness Concepts for EGNSS Timing Services
Martti Kirkko-Jaakkola, Sarang Thombre, Salomon Honkala, Stefan Söderholm, Sanna Kaasalainen, and Heidi Kuusniemi, Hein Zelle and Henk Veerman, Anders Wallin, Kjell Arne Aarmo and Juan Pablo Boyero Peer Reviewed

3353 - 3367

Ionospheric Effects on High Gain Antenna GNSS Measurements – TEC Estimation and Correction
Steffen Thoelert, Ulrich Hörmann, Felix Antreich, Michael Meurer

3368 - 3374

Estimating Height and Thickness of an Ionospheric Irregularity Layer with a Closely-Spaced GNSS Receiver Array
Yang Su, Gary S. Bust, Kshitija B. Deshpande, Seebany Datta-Barua Best Presentation

3375 - 3388

Spaced Multi-GNSS Receiver Array as Ionosphere Radar for Irregularity Drift Velocity Estimation during High Latitude Ionospheric Scintillation
Jun Wang, Yu (Jade) Morton, Robert Robinson Peer Reviewed

3389 - 3401

Measuring and Monitoring Systematic Movements of Equatorial Plasma Bubbles Using Regional GPS TEC Data Maps
Rezy Pradipta and Patricia H. Doherty Peer Reviewed

3402 - 3408

GNSS Inter-satellite Ranging for Atmospheric Monitoring
Gregor Möller, Fabian Hinterberger, Robert Weber, Philipp Berglez, Janina Boisits and Johannes Böhm, Michel Tossaint Peer Reviewed

3409 - 3419

Coordination of GNSS Signals with LiDAR for Reflectometry
Roohollah Parvizi, James Henry, Norikazu Honda, Erik Donarski, Boris S. Pervan and Seebany Datta-Barua

3420 - 3433

Ionosphere Monitoring and GNSS Correction by a Real-time Ionospheric Tomography System in Japan
Susumu Saito, Mamoru Yamamoto, Chia-Hun Chen, Akinori Saito

3434 - 3440

Ocean-Reflected GNSS Signals Detection with Generalized Likelihood Ratio Test
Santiago Ozafrain, Pedro A. Roncagliolo, Carlos H. Muravchik

3441 - 3452

E6: Next Generation RF, Antenna and Digital Signal Processing Receiver Techniques

A Single Hemispiral Antenna for GNSS Interference Mitigation and Direction Estimation
Cara Yang Kataria, Jennifer Truman Bernhard, and Grace Xingxin Gao Peer Reviewed

3453 - 3459

Effect of Antenna Pattern Uniformity on the Pseudorange Tracking Error
S. Caizzone, M.-S. Circiu, W. Elmarissi, C. Enneking, M. Felux, K. Yinusa Best Presentation

3460 - 3470

Maximum Theoretical Interference Mitigation Capability of a GNSS Receiver as Limited by the GNSS Frontend
Thomas Kraus, Thomas Pany, Bernd Eissfeller

3471 - 3480

Self-contained Antenna Crosstalk and Phase Offset Calibration by Jointly Solving the Attitude Estimation and Calibration Problem
S. Zorn, M. Niestroj, S. Caizzone, M. Brachvogel, M. Meurer Peer Reviewed

3481 - 3493

Dual-Frequency Positioning via Time-Multiplexing of Single-Frequency Resources - or 'Mono-Frequency but not Single-Frequency'
James T. Curran, Aiden Morrison, Nadezda Sokolova

3494 - 3507

Codelesss Processing of BOC(10,5) Signals
Cillian O'Driscoll, James T. Curran

3508 - 3518

Carrier Tracking using Extended Kalman Filters for GNSS Synthetic Aperture Processing with a Rotating Antenna
Miguel A. Ribot, Joaquín Cabeza, Pau Closas, Cyril Botteron, Ferran Valdés, Bartomeu Alorda, Pierre-André Farine Peer Reviewed

3519 - 3537

An Anti-jamming and Anti-spoofing Digital Beamforming Platform for the GNSS-based ERTMS Train Control System
Alessandro Neri, Cosimo Stallo, Andrea Coluccia, Veronica Palma, Pietro Salvatori, Alessia Vennarini, Oscar Pozzobon, Giovanni Gamba, Samuele Fantinato, Mirko Barbuto, Alessio Monti, Filiberto Bilotti, Alessandro Toscano, Francesco Rispoli, Massimiliano Ciaffi

3538 - 3556

Towards a Self Contained Determination of Multi Antenna Radio Patterns
M. Niestroj, M. Brachvogel, S. Zorn, M. Meurer

3557 - 3565

GNSS System Design and Evaluation for IoT Applications
Toru Katsumoto, Katsumi Takaoka, Kazukuni Takanohashi, Mohamed Youssef

3566 - 3572

The Possibility of Using Power Inversion Adaptive Arrays in High-Precision GNSS Receivers
Hailong Xu, Xiaowei Cui, Wenyi Li, Mingquan Lu

3573 - 3583

F1: GNSS Receiver Processing and Navigation Algorithms 1

A Correlation, Measurement and Data Decoding Co-processor for Multi-GNSS Receivers
Nagaraj C. Shivaramaiah and Dennis M. Akos

3584 - 3592

Graphical Approach to Representation and Inference in Multi-Sensor State Estimation
Xin Zhang and Xingqun Zhan

3593 - 3598

Subcarrier Ambiguity Resolution Techniques for HOBOC Signals under Harsh Realistic Scenarios
Pedro Fernandes, Pedro Boto, Elena Simona Lohan, Gonzalo Seco-Granados, J.A. Garcia-Molina Peer Reviewed

3599 - 3614

Using Code Loop Tracking Observations to Characterize GNSS Receivers
Benjamin H. Downing Peer Reviewed

3615 - 3638

Compressed Sensing-aided Vector Tracking Algorithm for GNSS Receivers
Jumin Zhao, Xiaofang Zhao, Dengao Li, Doudou Deng, Chong Han

3639 - 3647

Detect and Remove the Blocked Channel in the Vector Tracking Loop based on Carrier to Noise Density Ratio
Xiaojun Zou, Baowang Lian, Peng Wu, Haowei Xu, Lin Zhang Best Presentation Peer Reviewed

3648 - 3660

Preliminary Test Results of Variable IF Tracking Loop (VITAL) for GNSS Signals
Chun Yang, Thomas Pany, Andrey Soloviev Peer Reviewed

3661 - 3679

Combined Algorithm for Satellite Selection for Open-sky and Constrained Environments
Yun-En Lee, An-Lin Tao and Shau-Shiun Jan

3680 - 3693

Exploiting Acceleration Features of LabVIEW Platform for Real-Time GNSS Software Receiver Optimization
Erick Schmidt and David Akopian

3694 - 3709

Implementation of a Multi-frequency, Multi-constellation and Real-time GNSS Software Receiver Using Dual Channel USRP
Kwi Woo Park and Chansik Park, Min Jun Lee

3710 - 3717

An Unaided Scheme for BeiDou Weak Signal Acquisition
Qian Meng, Jian-ye Liu, Shao-jun Feng, Qing-hua Zeng, Rui Xu Peer Reviewed

3718 - 3730

F2: GNSS Receiver Processing and Navigation Algorithms 2

GNSS Signal Waveform Estimation with 2.4 m Dish Antenna and a Synthetic Aperture Antenna
Ronny, Blum, Dominik Dötterböck, Thomas Pany

3731 - 3744

Snapshot Processing of High-Order BOC Signals in the Cloud: On Sensitivity and Distortion Effects
J.A. Garcia-Molina, J.A. Fernandez-Rubio, R. Weiler, M. Crisci Peer Reviewed

3745 - 3750

Computationally Efficient Receiver Design for Mitigating Multipath for Positioning with LTE Signals
Kimia Shamaei, Joe Khalife, Souradeep Bhattacharya, and Zaher M. Kassas Best Presentation Peer Reviewed

3751 - 3760

Multi-Receiver Direct Position Estimation Tested on a Full-Scale Fixed-Wing Aircraft
Arthur Hsi-Ping Chu and Grace Xingxin Gao Peer Reviewed

3761 - 3766

An Adaptive Carrier Tracking Algorithm for Low Altitude Mountain-based GPS Radio Occultation Measurement
Rong Yang, Yu Morton, Bo Han Peer Reviewed

3767 - 3774

Cycle Slip Detection and Correction of GPS/INS Tightly Integrated System Based on Bayesian Compressive Sensing
Dengao Li, Zhiying Ma, Jumin Zhao, Zheng Wei Peer Reviewed

3775 - 3783

A Collaborative Method for GNSS-based Inter-Agent Range Estimation and Hybrid Positioning Algorithm in Harsh Environment
Alex Minetto, Calogero Cristodaro, Fabio Dovis Peer Reviewed

3784 - 3795

A Cloud Optical Access Network for Virtualized GNSS Receivers
C. Fernández-Prades, C. Pomar, J. Arribas, J.M. Fàbrega, J. Vilà-Valls, M. Svaluto Moreolo, R. Casellas, R. Martínez, M. Navarro, F.J. Vílchez, R. Muñoz, R. Vilalta, L. Nadal, A. Mayoral Peer Reviewed

3796 - 3815

Benefits of Adaptive Kalman Filter-Based Single Point Positioning in Dense Urban Environments
Takaki Tominaga, Nobuaki Kubo

3816 - 3825

Noise Statistics Estimation Techniques for Robust GNSS Carrier Tracking
Jordi Vilà-Valls, Carles Fernández-Prades, Pau Closas, Javier Arribas

3826 - 3842

Efficiency Analysis of Cloud GNSS Signal Processing for IoT Applications
V. Lucas-Sabola, G. Seco-Granados, J.A. López-Salcedo, J.A. García-Molina, M. Crisci

3843 - 3852

The Design of Asynchronous Kalman Filter-based Tracking Loop in Digital Domain
Wenhui Lin, Xin Chen, Yuze Wang, and Di He

3853 - 3864

F3: GNSS Resilience Technologies

A Low-power Authentication Signal for Open Service Signals
Elias Gkougkas, Dominik Dötterböck, Thomas Pany and Bernd Eissfeller

3865 - 3878

A New GNSS Scintillation Model
Charles Rino, Brian Breitsch, Yu Jaio, Dongyang Xu, Yu Morton, Charles Carrano Best Presentation Peer Reviewed

3879 - 3887

Adaptive Signal Processing Method using a Single-element Dual-polarized Antenna for GNSS Interference Mitigation
Kwansik Park, Dongkoog Lee, Jiwon Seo

3888 - 3897

Multipath Mitigation Using Circular Rotating Antenna
Lin Xie, Xiaowei Cui, Tianyi Ma, and Mingquan Lu

3898 - 3909

Designing and Evaluating Next Generation of Resilience Receivers
S. Cancela, D. Calle, G. Arroyo, A. Dalla Chiara, G. Da Broi, O. Pozzobon, C. Sarto, J. Winkle, I. Krol, P. Webster, I. Fernández-Hernández, J. Simón, G. Seco-Granados

3910 - 3923

Chirp Mitigation for Wideband GNSS Signals with Filter Bank Pulse Blanking
Alexander Rügamer, Shrikul Joshi, J. Rossouw van der Merwe, Fabio Garzia, Wolfgang Felber, Jan Wendel, Frank M. Schubert

3924 - 3940

Robust Ranging in the Presence of Repeater Signals
Andreas Iliopoulos, Christoph Enneking, Thomas Jost, Omar Garcia Crespillo, Manuel Appel, Felix Antreich Peer Reviewed

3941 - 3957

NLOS Multipath Detection by Using Machine Learning in Urban Environments
Taro Suzuki, Yusuke Nakano, Yoshiharu Amano

3958 - 3967

Feasibility and Limitations of Self-Spoofing Attacks on GNSS Signals with Message Authentication
Gianluca Caparra, Silvia Ceccato, Nicola Laurenti, Justan Cramer Peer Reviewed

3968 - 3984

F4: High Precision GNSS Positioning

Satellite Phase Bias Estimation with Global Networks and High-Dimensional Integer Ambiguity Fixing
Patrick Henkel, Dimitrios Psychas, Christoph Günther Peer Reviewed

3985 - 3996

GNSS Antenna Phase Center Variation Calibration for Attitude Determination on Short Baselines
Daniel Willi, Michael Meindl, Hui Xui, Markus Rothacher Best Presentation Peer Reviewed

3997 - 4010

High Availability of Real-time PPP by Extending SSR Orbit and Clock Corrections
Hongzhou Yang Student Paper Award Peer Reviewed

4011 - 4025

Single-Epoch Ambiguity Resolution for Urban Ultra-Short Baseline Attitude Determination Using Low-Cost GNSS Receivers
Wenyi Li, Xiaowei Cui, Sihao Zhao, Mingquan Lu Peer Reviewed

4026 - 4037

Single-Frequency GNSS Positioning for Assisted, Cooperative and Autonomous Driving
Peter F. de Bakker and Christian C.J.M. Tiberius

4038 - 4045

Cycle-slip Detection for Triple-frequency GPS Observations Under Ionospheric Scintillation
Dongsheng Zhao, Gethin Wyn Roberts, Craig M. Hancock, Lawrence Lau, Ruibin Bai Peer Reviewed

4046 - 4054

GPS/BDS Combined Precise Point Positioning with Geostationary Satellites Offset
Longwei Xu, Hui Liu, Bao Shu, Chuang Qian, Rufei Zhang Peer Reviewed

4055 - 4065

F5: Atmospheric Science and Space Applications

GNSS Enabling New Capabilities in Space on the TechDemoSat-1 Satellite
Martin Unwin, P. Jales, S. Duncan, A. Palfreyman, C. Gommenginger, G. Foti, Philip Moore, Jing Guo, Josep Rosello Peer Reviewed

4066 - 4079

Ground-to-Air Tropospheric Mapping Function for Elevation Angles Below Three Degrees
Shrivathsan Narayanan, Okuary Osechas and Christoph Günther Peer Reviewed

4080 - 4089

Modified Kriging Based Double-Difference Tropospheric Correction Interpolation Method for Network RTK User
Donguk Kim, Junesol Song, Deokhwa Han, Sunkyoung Yu, and Changdon Kee, Seungwoo Seo and Junpyo Park

4090 - 4102

A Machine Learning Approach to GNSS Scintillation Detection: Automatic Soft Inspection of the Events
Alfredo Favenza, Alessandro Farasin, Nicola Linty, and Fabio Dovis

4103 - 4111

Robust GPS Carrier Tracking Algorithms During Strong Equatorial Scintillation for Dynamic Platforms
Dongyang Xu, Y.T. (Jade) Morton, Yu Jiao, Charles Rino

4112 - 4121

Long-Term Analysis of Carrier Phase Residual Variations Using Geometry-Ionosphere-Free Combination of Triple-Frequency GPS Observations
Brian Breitsch, Jade Morton, Charles Rino Best Presentation Peer Reviewed

4122 - 4138

Analysis of the Interoperability of the GPS and Galileo Ionosphere Models
Hyunho Rho and Richard B. Langley, Bastiaan Ober, Raül Orús Pérez, Roberto Prieto-Cerdeira Peer Reviewed

4139 - 4160

Analysis Impacts of the Varying Heights on Ionospheric Modeling and DCB Estimation
Yan Xiang and Yang Gao

4161 - 4175

F6: GNSS Augmentation Systems and Integrity

Kinematic PPP Ambiguity Resolution with Aid of Map Matching
Fei Liu Student Paper Award Peer Reviewed

4176 - 4183

Coasting Through Wideband Interference Events using Robust Carrier Phase Tracking
Stefan Stevanovic and Boris Pervan

4184 - 4196

Ephemeris Monitor for GBAS Using Multiple Baseline Antennas with Experimental Validation
Samer Khanafseh, Jaymin Patel, and Boris Pervan

4197 - 4209

Satellite Selection in the Operational GBAS Context
Daniel Gerbeth, Maria Caamano, Mihaela-Simona Circiu, Michael Felux Peer Reviewed

4210 - 4220

GDOP Bounds for GNSS Augmented with Range Information
Peter F. Swaszek, Richard J. Hartnett, Kelly C. Seals

4221 - 4235

A MATLAB Toolset to Determine Strict Gaussian Bounding Distributions of a Sample Distribution
Juan Blanch, Todd Walter, Per Enge Peer Reviewed

4236 - 4247

Multi-Constellation T-RAIM: An Experimental Evaluation
Ciro Gioia and Daniele Borio Best Presentation

4248 - 4256