Contents

Part I Satellite Navigation Technology

Theoretical Study for Bare Soil Freeze/Thaw Process Detection Using GNSS-R/MR 3
Xuerui Wu, Shuanggen Jin, Yuanting Li and Yanfang Dong

The Application of BDS/GPS/GLONASS Data Fusion in FAST Measurement 13
Benning Song, Lichun Zhu, Dongjun Yu and Hui Yuan

Research on BDS/GPS Combined Single-Epoch Attitude Determination Performance 23
Kang Zhang and Jinming Hao

Calculating High Frequency Earth Rotation Parameters Using GPS Observations and Precision Analysis 33
Xuexi Liu, Erhu Wei and Lingxuan Wang

A Comparative Analysis of Relative Positioning Methods for BDS/GPS in Three Different Fields of Combination 45
Lingchuan Wan, Guanwen Huang, Rui Tu, Juqing Zhang and Junqiang Han

Deformation Monitoring and Precision Analysis Based on BDS/GPS Dual System Combination 59
Lei Ren, Tianhe Xu, Qingsong Ai and Yuguo Yang

The Research on Nonlinear Attitude Determination Method of GNSS Multi-antenna Attitude Measurement 73
Yuan Tian, Lifen Sui, Bing Wang, Qing Dai, Yijun Tian and Tian Zeng

Estimation and Evaluation of the Precipitable Water Vapor from GNSS PPP in Asia Region 85
Zhimin Liu, Yangyang Li, Fei Li and Jinyun Guo
Correlation Analysis Among GPS-SNR, Precipitation 
and GPS-PWV .................................................. 97
Min Mao, Li Wang, Shuangcheng Zhang, Xiaolei Wang and Peng Hu

The Determination of Plumb-Line Deviation by Adopting 
GNSS/ Leveling Method in Super Long Tunnel Break-Through 
Measurement .................................................. 107
Ji Ma, Zhiqiang Yang and Guofeng Ji

BDS/GPS High Precision Railway Deformation Monitoring 
Software Design and Verification ............................... 127
Rongpan Xu, Zhaoying Liu, Zhaofeng Gao, Daquan Tang 
and Yingying Zhang

Application Performance Analysis of Three GNSS Precise 
Positioning Technology in Landslide Monitoring ............... 139
Guanwu Huang, Yuan Du, Lumin Meng, Guanwen Huang, Jin Wang 
and Junqiang Han

GPS Signal to Noise Ratio Analysis and Using for Real-Time 
Tide Monitoring .................................................. 151
Kai Liu, Shuang-cheng Zhang, Qianyi Wang, Qin Zhang, 
Jing-jiang Zhang and Yang Nan

Ship Detection and Data Processing by Using Shore-Based 
GNSS-R ............................................................ 163
Chaoqun Gao, Dongkai Yang, Yunlong Zhu, 
Xuejing Qiu and Lei Yang

Characteristic of GPS SNR and It’s Application 
for Snow Depth Monitoring Analysis ............................. 175
Ning Zhang, Shuangcheng Zhang, Yuefan He, Qin Zhang, 
Xiaojuan Zhang and Tianhe Wan

A Fast Algorithm of GNSS-R Signal Processing Based on DBZP ..... 187
Lin Han, Yansong Meng, Yanguang Wang and Xingyuan Han

Model Establishment and Analysis of Weighted Mean Temperature 
in the Region of Guilin .......................................... 199
Zixin Chen, Junyu Li, Lilong Liu, Guiren Luo and Xuqi Mo

GNSS-R Ocean Altitude Detection Technology Based 
on Carrier Phase Assistant .................................... 209
Liang Kan, Meng Li, Junbo Han, Juanjuan Dong, Linfei He, 
Kangning Zhang, Yingna Liu and Dingcheng Tang

Characteristics of Coordinate Time Series of Shenzhen 
Continuously Operating Reference Stations ..................... 219
Shuguang Wu, Guigen Nie and Haiyang Li
Contents

Voxel Nodes Model Parameterization for GPS Water Vapor
Tomography ................................................................. 233
Nan Ding, Shubi Zhang, Xin Liu and Yili Xia

The Spatial Deformation Characteristic Analysis of CORS Stations:
A Case Study of Tianjin CORS ........................................ 243
Wei Wang, Zhong Jie Sheng, Qi Zhang, Yong Huang
and Bastiaan van Loenen

Wide Area Beidou Foundation Enhanced Grid Space-Time
Interlinked Science and Education Collaborative
Experimental Service ..................................................... 255
Jianping Xing, Zedong Wang, Zidong Wang, Zhao Wang,
Shengli Wang and Tao Yang

Single-Antenna Attitude Determination Using GNSS
for Low-Dynamic Carrier ............................................... 267
Wen Chen, Chao Yu, Miaomiao Cai and Yaxuan Dong

Differenced Measurements Between Satellites Applied on RTK
PPP for Structure Monitoring ......................................... 277
Xu Tang and XingXing Li

Research on Retrieval of PWV Based on PPP and NCEP/NCAR
Global Reanalysis 1 Data ............................................... 285
Zhilu Wu, Yanxiong Liu, Xiufeng He, Kai Guo, Lina He and Menghao Li

Determining the Reasonable Time Resolution of the Precise
Satellite Clock Bias Products .......................................... 297
Zhiping Liu, Dantong Zhu, Qianxin Wang and Jian Wang

Part II Navigation and Location Service

Pseudolite Cellular Network in Urban and Its High Precision
Positioning Technology .................................................. 313
Xingli Gan, Baoguo yu, Zhang Heng, Zhu Ruihui and Li Yaning

Performance Analysis for AP Selection Strategy ................... 325
Xianghong Hua, Wei Zhang, Kegen Yu, Weining Qiu,
Shoujian Zhang and Xin Chang

Definition of Conversion and Allocation Model for GNSS
Index Basing Navigation Performances ........................... 335
Mengli Wang, Jinping Chen, Yang Yang, Yuan Hong and Junyi Xu

Analysis of GPS for Monitoring Rain and Snow Weather .......... 347
Xiaowei Hou, Shuangcheng Zhang, Zhengxun He, Qin Zang,
Tianhe Wan and Xiaojuan Zhang
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evolutionary Particle Filter for Indoor Navigation and Location</td>
<td>357</td>
</tr>
<tr>
<td>Jian Chen, Gang Ou, Ao Peng, Lingyu Chen, Lingxiang Zheng and Jianghong Shi</td>
<td></td>
</tr>
<tr>
<td>An Indoor Three Dimensional Positioning Algorithm Based on Attitude Identification and Visible Light Propagation Model</td>
<td>367</td>
</tr>
<tr>
<td>Qu Wang, Haiyong Luo, Xile Gao, Jie Wei and Fang Zhao</td>
<td></td>
</tr>
<tr>
<td>An Indoor Positioning and Navigation Technique Based on Wi-Fi Fingerprint and Environment Information</td>
<td>381</td>
</tr>
<tr>
<td>Boxiong Han and Long Zhao</td>
<td></td>
</tr>
<tr>
<td>Identification of LBS Deception for Smart Phone Based on the Speed Consistency</td>
<td>395</td>
</tr>
<tr>
<td>Da-peng Li, Ting Liu, Wei-na Hao, Bing Liu, Ling-chuan Zeng and Yan-kun Li</td>
<td></td>
</tr>
<tr>
<td>iBeacon/WiFi Signal Characteristics Analysis for Indoor Positioning Using Mobile Phone</td>
<td>405</td>
</tr>
<tr>
<td>Ling Yang, Bofeng Li, Haojun Li and Yunzhong Shen</td>
<td></td>
</tr>
<tr>
<td>Research on Signal Design Method of Pseudolite “Near-Far Effect” Based on TDMA Technique</td>
<td>417</td>
</tr>
<tr>
<td>Xu Liu</td>
<td></td>
</tr>
<tr>
<td>Precision Analysis of CNAV Broadcast Ephemeris and Its Impact on the User Positioning</td>
<td>431</td>
</tr>
<tr>
<td>Ahao Wang, Junping Chen and Jiexian Wang</td>
<td></td>
</tr>
<tr>
<td>Research on Path Loss and Multipath Propagation of Indoor Pseudolite Signal</td>
<td>441</td>
</tr>
<tr>
<td>Yaning Li, Baoguo Yu and Xingli Gan</td>
<td></td>
</tr>
<tr>
<td>The GNSS/Inertial Navigation Based Private Car Incentive Travel Information Platform</td>
<td>453</td>
</tr>
<tr>
<td>Zhao Wang, Jianping Xing, Qianli Yang, Shengli Wang and Zedong Wang</td>
<td></td>
</tr>
<tr>
<td>Research on the Next Generation of Emergency Positioning Signal Design and Ground Stations Receive Processing Based on GNSS</td>
<td>465</td>
</tr>
<tr>
<td>Henglin Chu, Tianqiao Zhang, Jiemin Shen, Hongbing Wang and Jingyuan Li</td>
<td></td>
</tr>
<tr>
<td>Obstacle Avoidance Path Planning of Rotor UAV</td>
<td>473</td>
</tr>
<tr>
<td>Xiaodong Zhang, Xiangyang Hao, Guopeng Sun and Yali Xu</td>
<td></td>
</tr>
<tr>
<td>Orbit Analysis for Tiangong-2 Space Lab Under Different Perturbation Forces</td>
<td>485</td>
</tr>
<tr>
<td>Lina He, Wenli Wang and Zhilu Wu</td>
<td></td>
</tr>
</tbody>
</table>
Research on Topological Map Building Based on Crowdsourcing Data ........................................ 495
Xinzheng Lan, Ying Xu, Dongyan Wei and Hong Yuan

Part III Test and Assessment Technology

High Precision Broadband Direct-Spread Signal Delay Control Based on Phase Controlled Waveform Hermite Interpolation .............. 515
Xin Zhang, Ziqing Ye and Fenghua Mei

The Evaluation of Improvement of GPS Performance Combined with Quasi-Zenith Satellite System in Japan Area ....................... 525
Xuying Ma, Xiaping Ma, Chengpan Tang and Xingyu Wang

Study on Test Consistency Which Based on the Record and Playback Instrument .................................................. 533
Tian Wang, Wenbin Yang, Ming Peng, Shufeng Zhang, Qiang Chen and Weitao Wang

Multipath Effect Analysis of Beidou Satellite Pseudorange and Its Correction ...................................................... 547
Shengchao Wang, Xiaolin Jia, Guofeng Ji, Qingsong Ai, Meiqian Guan and Teng Peng

The Research on Time Series Modeling of ARMA and Medium/Long-Term Forecasting Method Using Global Ionospheric Harmonic Coefficient .................................................. 561
Xiude Chen, Xiaolin Jia, Yongxing Zhu, Na Cheng, Shengyang Gao and Meiqian Guan

Comparison and Evaluation of Satellite Performance Based on Different Clock Products .............................................. 577
Jie Zheng, Meijun Guo, Chao Xiong and Yun Xiao

Research on Monitoring and Evaluating Method of Beidou Monitoring Receiver Inter-frequency Bias .............................. 591
Gang Wang, Weigang Zhu and He Zhao

BDS Multipath Real-Time Estimation Based on Generalized Regression Neural Network ............................................. 599
Zongpeng Pan, Hongzhou Chai, Yang Chong, Yulong Kong and Rui Wang

Ephemeris Type B Fault Detection for BDS .......................... 609
Guanlong Wang, Xiaowei Cui, Yun Zhang and Liu He

Radiation Pattern Measurement for Earth Station Antenna Based on UAV ......................................................... 619
Zheng Wang and Chunjie Qiao
Research on Performance Evaluation of Beidou Be Enhanced by Pseudolites .......................................................... 629
Jingyang Fu, Guangyun Li, Tingsong Tang, Li Wang and Yanglin Zhou

Civil Avionic EMI Surrounding Impact Assessment and Testing on the Performance of Beidou B1I Signal ......................... 645
Pengfei Wang, Xiaofeng Shi, Taosheng Wang and Zhipeng Wang

Research on Design and Implementation of the Test Support System Architecture for GNSS Ground Control Segment .......... 659
Zhixue Zhang, Jinshi Xie, Na Zhao, Dongxia Wang and Xin Jie

Analysis of Signal Quality and Navigation Performance for Beidou System ................................................................. 671
Shaohua Dou, Cuilin Kuang, Yaozong Zhou and Zhonghai Yi

Influence of Space Environment on the Beidou Satellite and Its Countermeasures ............................................................ 683
Ailing Zhang, Xingyu Wang, Ting Wang, Wenjie Liang and Ni Kang

VPL Optimization Method with Multi-objective Program ......................... 701
Xueen Zheng, Chengdong Xu, Fei Niu and Anjin Li

Multi-station Combined Evaluation Method for Navigation Signal Tracking Error Based on Optimization Weight ............... 713
Jianlei Yang, Qinan Zhi, Song Xie and Xiaonan Li

Test and Evaluation on Timing Performance of BeiDou IGSO-6 Satellite ................................................................. 723
Dan-dan Li, Feng Zhu, Long-xia Xu, Bo Li and Xiao-hui Li

Research of Navigation Terminal Test Method Based on Real Playback Signal ................................................................. 739
Xiaoxi Jin, Yuze Wang and Rendong Ying

Part IV User Terminal Technology

Space-borne BDS and GPS Receiver of LING QIAO: Results over Two Years In-orbit Operation ................................. 753
Sihao Zhao, Xi Chen, Sen Yuan, Linling Kuang and Mingquan Lu

Modeling and Simulation of Receiver-Spoofer Attacking Process in Tracking Stage ................................................... 763
Meng Zhou, Hong Li, Peng Liu and Mingquan Lu

Low Power Consumption Control Method for Navigation Receiver with Multi-stage Bandwidth ......................... 777
Daowei Chen, Hong Lei Lin and De-hui Xu
A Vector and Scalar Hybrid Tracking Loop for New GenerationComposite GNSS Signal .......................................................... 791
Honglei Lin, Shengqiang Lou, Xiaomei Tang, Bo Xu and Gang Ou

A Kinematic GNSS Positioning Method Based on UnscentedKalman Filter ................................................................. 807
Chunhua Li, Guofu Pan, Chenglin Cai, Chenggang Li
and Xiaoyu Shi

Analysis of Cross-Correlation Peak Distortion Causedby Antenna Array Space-Time Adaptive Processing .............. 821
Xinzhi Dai, Junwei Nie, Baiyu Li, Zukun Lu and Gang Ou

Joint Implementation of Interference Suppression and SignalAcquisition for GNSS Antenna Array Receivers ..................... 833
Feiqiang Chen, Junwei Nie, Guozhu Zhang, Zhengrong Li
and Feixue Wang

GNSS Spoofing Detection Based on Power Monitoringof Two-Antenna ............................................................. 843
Fei Wang, Hong Li and Mingquan Lu

Application Strategy and Receiver Verification for the NewGeneration of BeiDou Navigation Satellites ........................... 853
Bin Tang, Jinlong Li, Qian Wang and Jiazheng Fu

A Polarization Anti-jamming Algorithm Based on Space-FrequencyConstraints ................................................................. 861
Yongxiang Zheng, Chao Ren and Gang Hu

Navigation Terminal Test Decision Scheme Designand Verification .............................................................. 869
Zhiheng Zhang, Weiwei Qiu and Zi Wang

Study on Identification Parameters and Updating Mechanismof Beidou Navigation Message .......................................... 877
Hailing Wu, Hui Liu, Rufei Zhang, Cheng Liu, Hang Ruan and Jun Mo

Research on Multipath Interference Suppression Algorithm Basedon Blind Equalization ................................................ 889
Dengao Li, Chong Han, Jumin Zhao, Xiaofang Zhao and Doudou Deng

A Fundamental Architecture of Anti-spoofing GNSS Receiver .... 899
Li He, Hong Li and Mingquan Lu

Performance Analysis on High Dynamic Signal Acquisitionof INS-Aided BDS Receiver ............................................. 911
Xiaqing Tang, Shulei Chen, Xuwei Cheng,
Junqiang Gao and Zepeng Sun
The Real-Time Realization and Performance Analysis of BDS Vector Receiver .................................................. 923
Cailun Wu, Song Xie, Jianwei Zhang and Yachuan Li

Parameters Design Method of Kalman Filter-Based Tracking Loop in GNSS/INS Deep Integration ......................... 933
Bing Li, Wenfei Guo, Xiaoji Niu, Nesreen I. Ziedan and Jingnan Liu

Optimal Carrier Tracking PLL in the Presence of Phase Noise in GNSS Receiver ............................................. 945
Shenhui Xue, Xinxing Huang, Zengjun Liu, Xiangwei Zhu
and Guangfu Sun

A GNSS Spoofing Detection Technique Based on Signal Spatial Correlation ...................................................... 959
Zhenglin Geng, Junwei Nie, Zhibin Xiao,
Xiangwei Zhu and Feixue Wang

A Multi-mode Multi-channel C Band CAPS Terminal Transceiver Chip Design ..................................................... 971
Siyuan He, Wei Liu, Xiangwei Wang, Chaoxian Zhu, Gong Zhang,
Sijing Hu, Changhong Zhang, Fangfang Zhang, Yu Zheng,
Dongchun Wang, Qiangyu Hao, Weifeng Zhang, Mingzhao Wang,
Hongyin He, Xiaolan Wang and Guanyi Ma

Parameters Estimation Method for LFM Interference to GNSS Uplink Injection .................................................. 985
Shuren Guo, Hang Ruan and Hailing Wu

Analysis of Threshold Setting for Eigenvalue Ratio Based Interference Detection Under Constant Missed Detection Probability ................................................................. 997
Gangqiang Guan, Deyong Xian, Liu Shi, Jia Mu and Xinshu Zhao

Ranging Performance Analysis and Discriminator Parameters Optimization for Double Estimator Technology ........ 1009
Yang Gao, Henglin Chu, Zheng Yao and Xiaowei Cui
China Satellite Navigation Conference (CSNC) 2017
Proceedings: Volume I
Sun, J.; Liu, J.; Yang, Y.; Fan, S.; Yu, W. (Eds.)
2017, XXII, 1019 p. 555 illus., Hardcover