

Contents

Part I Precise Orbit Determination and Positioning

1 A Satellite Selection Algorithm for Achieving High Reliability of Ambiguity Resolution with GPS and Beidou Constellations	3
Jun Wang and Yanming Feng	
2 Ocean Tidal Loading Effects to Displacements at GNSS Sites.	21
Dejun Zhao, Xinqiang Xu, Jing Li, Jinmei Duan and Liang Yu	
3 A Study on the Beidou IGSO/MEO Satellite Orbit Determination and Prediction of the Different Yaw Control Mode	31
Wei Wang, Gucang Chen, Shuren Guo, Xiaoyong Song and Qile Zhao	
4 Precise Orbit Determination for COMPASS IGSO Satellites During Yaw Maneuvers	41
Jing Guo, Qile Zhao, Tao Geng, Xing Su and Jingnan Liu	
5 Application of Thrust Force Model in GEO's Orbit Determination in Case of Maneuvers.	55
Jun-Li Zhang, Hong-Xing Qiu, Yong Yang and Wen-Ge Guo	
6 Study of Determination Orbit of COMPASS-GEO After Maneuvers with Short Segmental Arc	67
Jun-Li Zhang, Hong-Xing Qiu, Yong Yang and Wen-Ge Guo	
7 Precise Orbit Determination of BeiDou Regional Navigation Satellite System Via Double-Difference Observations	77
Jun Zhu, Jiasong Wang, Guang Zeng, Jie Li and Junshou Chen	

8	Accuracy Analyses of Precise Orbit Determination and Timing for COMPASS/Beidou-2 4GEO/5IGSO/4MEO Constellation	89
	Shanshi Zhou, Xiaogong Hu, Jianhua Zhou, Junping Chen, Xiuqiang Gong, Chengpan Tang, Bin Wu, Li Liu, Rui Guo, Feng He, Xiaojie Li and Hongli Tan	
9	Improving Efficiency of Data Analysis for Huge GNSS Network	103
	Junping Chen, Yize Zhang, Yibing Xie, Xuhua Zhou, Xiao Pei, Wei Yu and Bin Wu	
10	Ionospheric Grid Modeling of Regional Satellite Navigation System with Spherical Harmonics	113
	Jiachen Fan, Xiaoli Wu, Enqiang Dong, He Zhao, Haibo Kan and Jinshi Xie	
11	Lunar Satellite Orbit Measurement Based on Visual/Radio Fusion	123
	Yanlong Bu, Geshi Tang, Jianfeng Cao, Songjie Hu, Lue Chen and Baofeng Wang	
12	Performance Analysis of Single-Epoch Dual-Frequency RTK by BeiDou Navigation Satellite System	133
	Jinlong Li, Yuanxi Yang, Junyi Xu, Haibo He, Hairong Guo and Aibing Wang	
13	Research on Receiver Clock Jump Detection and Processing in Precise Point Positioning	145
	Rui Zhang, Yibin Yao, Runan Wu and Weiwei Song	
14	Positioning Error Research and Analysis Based on Comprehensive RDSS Method	153
	Ji Dong Cao, Ran Ran Su, Wei Jie Sun and Xin Shi	
15	Research on Technique of Single-Satellite Orbit Determination for GEO Satellite of Partial Subsatellite Point	163
	Xiao Jie Li, Jian Hua Zhou, Li Liu, Ji Dong Cao, Rui Guo, Feng He, Shan Wu and Hua Huang	
16	BeiDou Regional Navigation System Network Solution and Precision Analysis	173
	Yang Liu, Yidong Lou, Chuang Shi, Fu Zheng and Qianqian Yin	

17 A Method Based on the Orbital Error Correction of the Wide Area Differential Positioning Algorithm	187
Ranran Su, Nan Xing, Lei Zhang, Li Liu, Guifen Tang, Guangming Hu and Min Ma	
18 Realization of High-Precision Relative Positioning Using Beidou Regional Navigation Satellite System	197
Laiping Feng, Wei Zhou and Xianbing Wu	
19 GOCE Precise Orbit Determination Using Pure Dynamic Method and Reduced Dynamic Method	211
Tianhe Xu, Min Li and Kangkang Chen	
20 Precise Orbit Determination of BeiDou Satellites Using Satellite Laser Ranging	221
Gang Zhao, Shanshi Zhou, Xuhua Zhou and Bin Wu	
21 Prediction of UT1-UTC Based on Combination of Weighted Least-Squares and Multivariate Autoregressive	231
Zhang-zhen Sun and Tian-he Xu	
22 Precise Point Positioning Using Combined Beidou and GPS Observations	241
Lizhong Qu, Qile Zhao, Min Li, Jing Guo, Xing Su and Jingnan Liu	
23 The Establishment and Precision Analysis of Global Ionospheric Model of COMPASS System	253
Xiuqiang Gong, Nan Xing, Shanshi Zhou, Yueling Cao, Xiaogong Hu and Bin Wu	
24 Analysis of Effect About On-Orbit Satellite Properties to Pseudo-Range Measurement	265
Hui Yang, Meihong Li and Hong Mi	
25 Towards a Precise Multi-GNSS Positioning System Enhanced for the Asia-Pacific Region	277
Xiaoming Chen, Herbert Landau, Feipeng Zhang, Markus Nitschke, Markus Glockner, Adrian Kipka, Ulrich Weinbach and Dagoberto Salazar	
26 Cycle Slip Detection and Repair with Different Sampling Interval Based on Compass Triple-Frequency	291
Kai Xie, Hongzhou Chai, Min Wang and Zongpeng Pan	

Part II Atomic Clock Technique and Time-Frequency System

27 Progress Towards a Microwave Atomic Clock Based on the Laser-Cooled Cadmium Ions 307
Jianwei Zhang, Shiguang Wang, Kai Miao, Zhengbo Wang and Lijun Wang

28 The Electronic System of ^{87}Rb CPTMaser Atomic Clock 315
Wenyu Zhao, Xin Wang, Xiaofeng Li, Jie Liu, Kan Zhao and Shougang Zhang

29 Research of Satellite Clock Error Prediction Based on RBF Neural Network and ARMA Model 325
Xiaoyu Li, Xurong Dong, Kun Zheng and Yatao Liu

30 Progress on Linear Ion Trap Mercury-Ion Frequency Standard 335
Hao Liu, Yuna Yang, Yuehong He, Haixia Li, Zhihui Yang, Yihe Chen, Lei She and Jiaomei Li

31 The Research of Miniaturization CPT Rb Atomic Clocks 341
Shuangyou Zhang, Zhong Wang and Jianye Zhao

32 Fiber Based Time and Frequency Synchronization System 349
Bo Wang, Chao Gao, Weiliang Chen, Yu Bai, Jing Miao, Xi Zhu, Tianchu Li and Lijun Wang

33 Progress on Sapphire Hydrogen Maser for Beidou Navigation System 357
Tiezhong Zhou, Qiong Wu, Jian Huang and Lianshan Gao

34 High-Resolution Frequency Measurement of the Ground-State Hyperfine Splitting of $^{113}\text{Cd}^+$ Ions 371
Shiguang Wang, Jianwei Zhang, Kai Miao, Zhengbo Wang and Lijun Wang

35 Development of New-Generation Space-Borne Rubidium Clock 379
Chunjing Li, Tongmin Yang, Liang Zhai and Li Ma

36 Novel Scheme for Chip-Scale CPT Atomic Clock 387
Yi Zhang and Sihong Gu

37 An On-Board Clock Integrity Monitoring Algorithm for Detecting Weak Anomaly Bias	397
Xinming Huang, Hang Gong, Wenke Yang, Xiangwei Zhu and Gang Ou	
38 Non-Reciprocity Correction Using Broadcast Ephemeris in Two-Way Satellite Time and Frequency Transfer (TWSTFT)	407
Wenke Yang, Hang Gong, Xiangwei Zhu and Guangfu Sun	
39 Progress of the Portable Rubidium Atomic Fountain Clock in SIOM	419
Yuanbo Du, Rong Wei, Richang Dong and Yuzhu Wang	
40 Precision Analysis of RDSS Two-Way Timing	425
Bingcheng Liu, Jianghua Qu, Hong Yuan, Lijuan Xu and Ting Liu	
41 Demonstration of a Physics Package with High SNR for Rubidium Atomic Frequency Standards	435
Wenbing Li, Songbai Kang, Gang Ming, Feng Zhao, Feng Qi, Fang Wang, Shaofeng An, Da Zhong and Ganghua Mei	
42 Realization and Performance Analysis of Time and Frequency Remote Calibration System	445
Tao He, Huijun Zhang, Xiaohui Li and Zhixiong Zhao	
43 Use of the Global Navigation Satellite Systems for the Construction of the International Time Reference UTC	457
Z. Jiang and E. F. Arias	

Part III Integrated Navigation and New Methods

44 Research and Implementation of Ambiguity Resolution for Combined GPS/GLONASS/COMPASS Positioning	469
Xiaoyu Shi, Benyin Yuan and Zhixiong Bao	
45 A New Celestial Positioning Model Based on Robust Estimation	479
Chonghui Li, Yong Zheng, Zhuyang Li, Liang Yu and Yonghai Wang	

46	Experiment and Validation System for X-ray Pulsar-Based Navigation	489
	Zhe Su, Yansong Meng, Qibing Xu, Xiaoliang Wang and Xingang Feng	
47	The Research on Indoor High Accuracy Frequency Source Based on Adaptive Loop Adjusting	497
	Zhongliang Deng, Xu Li and Xie Yuan	
48	EMD De-Noising Theory Considering Static and Dynamic Conditions and Its Applications in INS	507
	Yu Gan, Lifen Sui, Guorui Xiao and Yu Duan	
49	A Novel BD-2 RTK/Binocular Vision Navigation Solution for Automated Aerial Refueling	517
	Yaqing Liu, Yulong Song and Baowang Lian	
50	An Adaptive Dual Kalman Filtering Algorithm for Locata/GPS/INS Integrated Navigation	527
	Zebo Zhou, Ling Yang and Yong Li	
51	The Timing Equation in X-Ray Pulsar Autonomous Navigation	543
	Qingyong Zhou, Jianfeng Ji and Hongfei Ren	
52	X-Ray Pulsar Signal Detection Based on Time-Frequency Distributions and Shannon Entropy	555
	Lu Wang and Luping Xu	
53	On the Agent Localizability of Hybrid GNSS-Terrestrial Cooperative Positioning	567
	Shiwei Tian, Weiheng Dai, Jiang Chang and Guangxia Li	
54	Precise Maritime Navigation with a Locata-Augmented Multi-Sensor System	577
	Wei Jiang, Yong Li, Chris Rizos, Joel Barnes and Steve Hewitson	
55	Sub-Pixel Water-Sky-Line Detection Based on a Curve Fitting Method	589
	Linyang Li, Chonghui Li, Yong Zheng and Chao Zhang	
56	The Precision Assessment System of TT&C Equipment Based on Unmanned Aerial Vehicle	599
	Wei Zhou and Jinming Hao	

57	Shadow Matching: Improving Smartphone GNSS Positioning in Urban Environments	613
	Lei Wang, Paul D. Groves and Marek K. Ziebart	
58	A Novel Three-Dimensional Indoor Localization Algorithm Based on Multi-Sensors	623
	Zhifeng Li, Zhongliang Deng, Wenlong Liu and Lianming Xu	
59	Particle Filtering in Collaborative Indoor Positioning	633
	Hao Jing, Chris Hide, Chris Hill and Terry Moore	
60	A MEMS Multi-Sensors System for Pedestrian Navigation	651
	Yuan Zhuang, Hsiu Wen Chang and Naser El-Sheimy	
61	Fusion of Wi-Fi and WSN Using Enhanced-SIR Particle Filter for Hybrid Location Estimation	661
	Dongjin Wu, Linyuan Xia and Jing Cheng	
62	Efficient Quality Control Procedure for GNSS/INS Integrated Navigation System	673
	Ling Yang, Yong Li and Youlong Wu	
63	Development and Evaluation of GNSS/INS Data Processing Software	685
	Quan Zhang, Xiaoji Niu, Linlin Gong, Hongping Zhang, Chuang Shi, Chuanchuan Liu, Jun Wang and Matthew Coleman	
64	Celestial Positioning with CCD Observing the Sun	697
	Yinhu Zhan, Yong Zheng and Chao Zhang	
65	Research on the Non-Cooperative Positioning Technologies for Combination of BeiDou and TD-LTE	707
	Zhongliang Deng, Xiaofei Sun, Yannan Xiao, Xiaoguan Wang, Neng Wan and Zhongwei Zhan	
66	Research on the NLoS Mitigation Algorithm for Integrated Navigation of BeiDou and TD-LTE	717
	Zhongliang Deng, Xiaofei Sun, Yannan Xiao, Xiaoguan Wang, Caihu Chen and Neng Wan	
67	An Adaptive Dynamic Kalman Filtering Algorithm Based on Cumulative Sums of Residuals	727
	Long Zhao and Hongyu Yan	

**68 Performance Evaluation of a Real-Time Integrated MEMS
IMU/GNSS Deeply Coupled System 737**
Tisheng Zhang, Hongping Zhang, Yalong Ban and Xiaoji Niu