

# **Global Navigation Satellite System: Technology Innovation and Application**

**Beijing, China  
8-9 August 2009**

**Editors:**

**Chuang Shi**

**ISBN: 978-1-61782-805-8**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2009) by the Scientific Research Publishing Inc.  
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the Scientific Research Publishing Inc.  
at the address below.

Scientific Research Publishing Inc.  
P.O. Box 54821  
Irvine, CA 92619-4821

Phone: (408) 329-4591

[bookorder@scirp.org](mailto:bookorder@scirp.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# Contents

Determining Orbit of COMPASS-M1 Using International Laser Ranging Service Data <i>JIA Xiaolin, FENG Laiping, REN Hongfei, SONG Xiaoyong</i> .....	(1)
POD of One GNSS Satellite Based on Multi-Model GNSS Receiver on Ground Stations and LEOs <i>ZHAO Qile, LI Min, HOU Fen</i> .....	(5)
Simulation on Combined Orbit Determination of Navigation Satellites with Cross-Link Ranging Observations and Ground Tracking Observations <i>LIU Wanke, GONG Xiaoying, LI Zhenghang, WANG Fuhong</i> .....	(9)
GLONASS Orbit Integration Algorithm and Accuracy Analysis <i>DAI Xiaolei, SHI Chuang, WANG Fuhong</i> .....	(16)
Simulation Analysis of Error Sources' Influences on COMPASS-M1 Orbit Determination <i>GENG Tao, ZHAO Qile, SHI Chuang</i> .....	(20)
Orbit Determination for Single Navigation Satellite COMPASS-M1 under Time Synchronization among Stations <i>LEI Hui, LI Zhigang, YANG Xuhai, WU Jiangfei</i> .....	(25)
Design and Implementation of SOA Operational GNSS System <i>FENG Yikai, LIU Yanxiong, GAO Xingguo, ZHOU Xinghua</i> .....	(30)
Research on the Integrity System for a Network RTK System <i>TANG Weiming, ZHAI Chuanrun, ZHAO Qile</i> .....	(34)
A New GNSS Network Positioning Service Software —EarthNet <i>PAN Shuguo, WANG Qing, KE Fuyang</i> .....	(39)
Research on the Architecture of Continuously Operating Reference Stations and the Characteristics of its Networks <i>LIU Hui, ZOU Rong, WANG Yu'e</i> .....	(43)
Studies on the Integration and Data Processing Technologies of Network RTK Based Low-Cost High Precision Terminal <i>TANG Weiming, MENG Xiaolin, SHI Chuang, SUN Fanghua</i> .....	(49)
Research on WUL Algorithm of Galileo System <i>GU Shouzhou, BEI Jinzhong, DANG Yamin</i> .....	(55)
EM Algorithm Used to Determine Satellite Orbit in the Case of Existing Systematic Errors <i>PENG Junhuan, LI Shuhui, FENG Chugang, CHEN Lei</i> .....	(60)
Bridge Structural Health Monitoring Using GPS Non-Ambiguity DD Method <i>LIU Zhiping, HE Xiufeng, REN Yinghua</i> .....	(66)
GPS Satellite Clock Bias Prediction Based on the Regression Forgetting Factor Least Squares Raw <i>ZHENG Zuoya, LU Xiushan, XU Weimei</i> .....	(71)
Robust KALMAN Model Based on Bifactor Equivalent Weights <i>WANG Jian, XU Changhui, GAO Jingxiang</i> .....	(76)
Design of GPS Receiver Embedded Positioning and Navigation Algorithm Solution <i>ZHANG Hongping, SHI Chuang, LV Haixia, HAN Wenhui, LIU Jingnan</i> .....	(81)
Robust Prediction Algorithm for GPS Satellite Clock Error Combining Clock's Physical Character and ARIMA Model <i>HUANG Guanwen, YANG Yuanxi, ZHANG Qin</i> .....	(88)
Improved TurboEdit Algorithm for Un-Differenced Phase Data Preprocessing <i>YUAN Yubin, DANG Yamin, CHENG Yingyan</i> .....	(94)

A Method of Repairing Dual-Frequency Dynamic Carrier Phase Cycle Slip <i>FENG Wei, DONG Xinggan, HUANG Dingfa</i> .....	(99)
Application of ARIMA Model in GPS Timing <i>LI Jianwen, CHEN Jun, LI Zuohu, LI Junzheng</i> .....	(105)
Assessment of ECMWF/NCEP Reanalysis and NCEP Forecast Data with GPS ZTD in China <i>CHEN Qinming, SONG Shuli, ZHU Wenyao, QU Weijing</i> .....	(108)
Research and Application of Real-Time Water Vapor Remote Sensing Using Ground Based GPS/Met <i>ZHANG Shuangcheng, YE Shirong, LIU Jingnan, ZHANG Qin</i> .....	(117)
Atmospheric Vapor Transportation Using GPS <i>CHANG Liang, HE Xiufeng</i> .....	(121)
Study of the Ionospheric TEC Rate in Hong Kong Region and its GPS/GNSS Application <i>LIU Zhizhao, WU Chen</i> .....	(129)
Modeling Regional Ionosphere by Adjusted Spherical Harmonic Analysis <i>AN Jiachun, WANG Zemin, DU Yujun</i> .....	(138)
Ionospheric Inversion with CHAMP/GPS Radio Occultation <i>ZHAO Ying, ZHANG Xiaohong, LIU Junning</i> .....	(144)
Topside Ionospheric Model Based on the Electron Density Profile Data of Cosmic Mission <i>PING Jingsong, SHI Xian, GUO Peng, YAN Haojian</i> .....	(150)
Time Series Analysis and Prediction on Ionospheric VTEC Data <i>LI Shuhui, PENG Junhuan</i> .....	(155)
Combining LEO Satellites (COSMIC) Navigation Data with Ground-Based (CMONOC) GPS Observations to Image Ionospheric Electron Density over China <i>LI Hui, YUAN Yunbin, OU Jikun, WEN Debao, LI Zishen</i> .....	(162)
Research of on Ionospheric Variation over China Area <i>GONG Yan, DANG Yamin</i> .....	(168)
Theory and Implementation of Medium Precision Three-Axis Integrative Fiber Optic Gyros IMU <i>ZHAO Shifeng, YANG Yuncun, DING Xincun</i> .....	(172)
An Integrated AUV Navigation Method Using Bayes Filtering <i>LI Jianlong, GUAN Xinghua, SUN Feng, XU Wen</i> .....	(178)
Attitude and Heading Reference System with Fiber Optics Gyroscope in High Dynamic Applications <i>YANG Yunchun, GUO Pengfei, DING Xinchun</i> .....	(183)
GPS-R Data Acquisition Test and Processing Analysis <i>YANG Dongkai, WANG Yan, LI Weiqiang, LU Yong</i> .....	(188)
Temporal Global Gravity Recovery from GRACE Satellite-To-Satellite Tracking Data Using Two-Step Method <i>ZHAO Qile, GUO Jing</i> .....	(192)
Research on Variation of Inland Water Storage Using GRACE Gravity Field Model <i>LIU Renli</i> .....	(199)
The Shipborne Kinematic Positioning Accuracy of Using GPS Precise Point Positioning (PPP) Technique: A Case Study in Shipborne Gravity Measurement around Taiwan <i>CHEN Kwohwa, Chen Yiju, HUANG Chihsun, HUANG Cheinway</i> .....	(205)
The Medium-Short Term Influences of Wenchuan Earthquake on the Horizontal Displacement of JSCORS Sites <i>WEI Haohan, SHEN Fei, HONG Shanbo</i> .....	(213)
Fault Slip of the 2008 Wenchuan 8.0Ms Earthquake by Inversion of GPS Measurements <i>WU Jicang, CHEN Yongqi, DANG Yaming, MENG Guojie</i> .....	(217)

The Analysis of Wenchuan Earthquake Regional Ground Motion and Coseismic Displacement	
<i>CHEN Hao, LIAO Hua, HUANG Dingfa, CHEN Weifeng</i> .....	(220)
Monitoring Wind-induced Deformation of Tall-Building by GPS Single Epoch Kinematic Positioning	
<i>KUANG Cuilin, DAI Wujiao, DING Xiaoli, KWOK, Kenny C. S., HITCHCOCK, Peter A.</i> .....	(224)
Software Development and Key-Technology Study on GPS Tidal Level	
<i>WANG Shengping, ZHAO Jianhu, SHAO Nan</i> .....	(230)
Research of VLBI in Lunar Satellite Precise Orbit Determination and Lunar Gravity Field Model Solution	
<i>YAN Jianguo, PING Jinsong, TANG Geshi, ZHENG Weimin, CAO Jianfeng</i> .....	(234)
Data Processing of Maintaining Provincial Geocentric Reference Frame with CORS	
<i>SHEN Fei, LI Jiancheng</i> .....	(240)
The Application of Continuous Operating Reference Station to the Opening of CGCS2000 in Province and City	
<i>SUI Mingming, HE Liheng, SHEN Fei</i> .....	(245)
High Frequency ERP Retrieved from GPS Data	
<i>DAI Chunli, PING Jinsong, ZHU Wenyao, WANG Guangli</i> .....	(250)
Estimation of the Coordinates Accuracy Tolerance of Geodetic SVLBI Satellite	
<i>WEI Erhu, CHENG Xiaohui, LIU Jingnan, TIAN Xiaojing</i> .....	(257)
Research on Bridge River-Crossing Levelling Using GPS Technology	
<i>WU Dijun, XIONG Wei, ZHENG Qiang</i> .....	(263)
Fusing Multiple Remote Sensing Data to Monitor Tianjin Urban Subsidence	
<i>LI Tao, ZHAG Shiyu, LIU Jingnan, LONG Sichun, JIANG tingcheng, XIA Ye, JIANG Yanxiang, LU Xu</i> .....	(268)
Sub-Swath Mosaic Method of Wide Swath SAR Interferometry	
<i>JIANG Tingchen, LI Tao, LIU Jingnan, ZHANG Shiyu, LONG Sichun</i> .....	(274)
A Novel Scheme of Tightly Coupled SINS/GPS Integration Technology in High Dynamic Circumstance	
<i>YANG Dongfang, WANG Shicheng, LIU Zhiguo, LUO Dacheng, ZHANG Jinsheng</i> .....	(278)
New GNSS Navigation Messages to Facilitate Fast TTFF and High Sensitivity	
<i>ZHANG Wentao, LIN Victor</i> .....	(285)
Design of Multi-Model GNSS Baseband Chip of BD2/GPS/GLONASS	
<i>ZHANG-Junlin</i> .....	(294)
Development of GNSS Software Receiver	
<i>LIU Xiaoli, LIU Jingnan, QI Zhanfeng, HE Nan</i> .....	(300)
Tracking Performance Analysis of BOC and MBOC Signals	
<i>LIU Xiaoli, ZHENG Yanfen, HU Xiyi</i> .....	(306)
Study on Algorithm of Ionospheric Scintillation Index Based on GPS Single Frequency Software Receivers	
<i>LI Jianwen, LI Zuohu, HAO Jinming, LIU Weiping</i> .....	(310)
Key Technologies of GPS/GALILEO Real-Time Software Receiver	
<i>ZHAI Chuanrun, MENG Xiangfu, LI Shi, LIU Junning</i> .....	(315)
MBOC: A New Spreading Modulation Recommended for GALILEO L1 OS and GPS L1C	
<i>LU Jun</i> .....	(321)
Ultra-Tightly Coupling of GNSS and INS for High Dynamic Navigation	
<i>HU Rui, SHI Chuang, YANG Yunchun, ZHANG Hongping, XUE Xiaozhong</i> .....	(326)
Analysis of Civil Navigation Message Format for GPS Modernization	
<i>LU Songtao, ZHAO Yun, KOU Yanhong, HUANG Zhigang</i> .....	(335)

An Improved Maximum Likelihood Method for GPS Bit Synchronization <i>ZHENG Rui, CHEN Mohan, BA Xiaohui, CHEN Jie</i> .....	(341)
An Improved Frequency Domain Parallel Code Acquisition Algorithm for GPS Signal <i>GE Sheng, WANG Qing, PAN Shuguo</i> .....	(347)
Design of a Software Simulator for Digitized IF Galileo Signals <i>ZHAI Chuanrun, LI Shi, LIU Junning</i> .....	(352)
Interface Model for GP2021 Baseband Signal Processing <i>YUAN Zhaokui, HU Congwei, GUO Zhi</i> .....	(357)
The Communication between the Mobile Terminal and Each Module of GPS and Laser Ranging Dynamic Positioning System <i>BAI Bing, ZHANG Chuanyin</i> .....	(362)
Improved ICCP Algorithm and Its Application in Underwater Geomagnetic Matching Navigation <i>ZHAO Jianhu, WANG Aixue, WANG Shengping</i> .....	(366)
Multi-Resolution Navigable Database and its Incremental Update Mechanism <i>ZHAO Weifeng, LI Bijun, YANG Bisheng</i> .....	(370)
The Application of Real-Time Traffic Data Organization in Vehicle Navigation System <i>SONG Ying, LI Bijun</i> .....	(376)
An Integrated Location Algorithm Utilizing GPS and WiFi Received Signal Strength <i>WU Yuhang, CHEN Xiuwan, HE Haijian</i> .....	(381)
Cooperative Location Technology Based on Mobile Emergency Terminals <i>CHU Tianxing, CHEN Xiuwan, WU Caicong, TANG Anning, SU Huaihong</i> .....	(385)
Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon-Hong Kong <i>JI Shengyue, CHEN Wu, DING Xiaoli, CHEN Yongqi, ZHAO Chunmei, HU Congwei</i> .....	(390)
Simulations and Applications of the Fluxgate Ring-Core Magnetization Model <i>LIU Si, PENG Tangchao, CAO Daping, JIANG Shunping, JIANG Changzhong</i> .....	(400)
Numerical Analysis of the Sensor Magnetic Field in Fluxgate Magnetometer <i>JIANG Shunping, CAO Daping, LIU Si</i> .....	(405)
Vehicle Guard Research Based on GPS and RFID <i>TANG Jian</i> .....	(409)
GPS Application at Multiple Target Tracking Test System <i>SHEN Yanpeng, QIN Jiafa, WANG Zhaohua, WANG Song</i> .....	(414)
GPS Application at Container Terminal <i>SHEN Yanpeng, ZHAO Chenrong, LIU Jian, ZHUANG Chaowen, QIN Jiafa</i> .....	(418)
Array CCD Intelligent Control System and Application Based on ARM and Azimuth Information <i>HOU Yanfang, YE Zetian, SUN Liye</i> .....	(422)

# 目 录

基于国际激光联测资料的 COMPASS-M1 定轨	贾小林, 冯来平, 任红飞, 宋小勇 (1)
基于星载与地面多模接收机的导航卫星单星定轨仿真分析	赵齐乐, 李 敏, 侯 芬 (5)
综合星间测距数据和地面跟踪数据的导航卫星联合定轨模拟计算	刘万科, 龚晓颖, 李征航, 王甫红 (9)
GLONASS 卫星轨道积分方法及其精度分析	戴小蕾, 施 闯, 王甫红 (16)
COMPASS-M1 卫星定轨误差源仿真分析	耿 涛, 赵齐乐, 施 闯 (20)
基于站间时间同步的 COMPASS-M1 单星定轨研究	雷 辉, 李志刚, 杨旭海, 吴江飞 (25)
国家海洋局 GNSS 业务化系统的设计与实现	冯义楷, 刘焱雄, 高兴国, 周兴华 (30)
网络 RTK 系统完备性体系组成研究	唐卫明, 翟传润, 赵齐乐 (34)
一种新的 GNSS 网络定位服务软件——EarthNet	潘树国, 王 庆, 柯福阳 (39)
连续运行参考站网络体系结构及其网络基本特征研究	刘 晖, 邹 蓉, 王玉娥 (43)
网络 RTK 低成本高精度终端集成和数据处理技术研究	唐卫明, 孟晓林, 施 闯, 孙方华 (49)
Galileo 系统 WUL 算法研究	谷守周, 秘金钟, 党亚民 (55)
EM 方法用于系统误差情况下的卫星定轨	彭军还, 李淑慧, 冯初刚, 陈 磊 (60)
GPS 无模糊度双差法在桥梁健康监测中的应用	刘志平, 何秀凤, 任迎华 (66)
基于递推遗忘因子最小二乘法的 GPS 卫星钟差预报	郑作亚, 卢秀山, 徐维梅 (71)
基于双因子抗差权的 KALMAN 滤波模型研究	王 坚, 许长辉, 高井祥 (76)
GPS 接收机嵌入式导航定位解算设计	章红平, 施 闯, 吕海霞, 韩文慧, 刘经南 (81)
基于钟差物理特性和 ARIMA 模型的 GPS 卫星钟差抗差预报算法	黄观文, 杨元喜, 张 勤 (88)
一种改进的 TurboEdit 数据预处理算法	袁玉斌, 党亚民, 成英燕 (94)
双频动态 GPS 载波相位周跳修正的一种方法	冯 威, 董兴干, 黄丁发 (99)
ARIMA 模型在 GPS 授时中的应用	李建文, 陈 军, 李作虎, 李军正 (105)
利用 GPS ZTD 检验 ECMWF/NCEP 分析和预报资料在中国地区的适用性	陈钦明, 宋淑丽, 朱文耀, 曲伟菁 (108)
地基 GPS 实时遥感水汽空间分布技术研究及应用	张双成, 刘经南, 叶世榕, 张 勤 (117)
基于 GPS 的大气水汽输送特征研究	常 亮, 何秀凤 (121)
Study of the Ionospheric TEC Rate in Hong Kong Region and its GPS/GNSS Application	Liu Zhizhao, Wu Chen (129)
利用改进的球谐分析建立区域电离层模型	安家春, 王泽民, 杜玉军 (138)
CHAMP/GPS 电离层掩星数据反演	赵 莹, 张小红, 刘峻宁 (144)
Topside Ionospheric Model Based on the Electron Density Profile Data of Cosmic Mission	Ping Jingsong, Shi Xian, Guo Peng, Yan Haojian (150)
电离层 VTEC 数据的时间序列分析和预报	李淑慧, 彭军还 (155)
Combining LEO Satellites (COSMIC) Navigation Data with Ground-Based (CMONOC) GPS Observations to Image Ionospheric Electron Density over China	Li Hui, Yuan Yunbin, Ou Jikun, Wen Debao, Li Zishen (162)
中国区域电离层 TEC 变化研究	巩 岩, 党亚民 (168)
三轴一体中等精度光纤陀螺 IMU 的理论与实现	赵世峰, 杨云春, 丁新春 (172)
基于贝叶斯滤波的 AUV 组合导航方法	李建龙, 官兴华, 孙 峰, 徐 文 (178)
光纤陀螺航姿系统在高动态领域的应用	杨云春, 郭鹏飞, 丁新春 (183)
GPS-R 数据采集试验与处理分析	杨东凯, 王 炎, 李伟强, 路 勇 (188)
基于二步法利用 GRACE 卫星跟踪卫星数据反演地球时变重力场	赵齐乐, 郭 靖 (192)
利用 GRACE 地球重力场模型研究中国内陆水储量变化	刘任莉 (199)
船载 GPS 精密单点定位技术之动态定位精度: 以台湾临近海域船载重力测量作业为例	陈国华, 陈逸如, 黄启训, 黄金维 (205)

汶川地震对 JSCORS 站点水平位移的中短期影响·····	魏浩翰, 沈 飞, 洪善波 (213)
Fault Slip of the 2008 Wenchuan 8.0Ms Earthquake by Inversion of GPS Measurements ·····	WU Jicang, CHEN Yongqi, DANG Yaming, MENG Guojie (217)
汶川地震震时近场地面运动与同震位移分析·····	陈 豪, 廖 华, 黄丁发, 陈维锋 (220)
GPS 单历元动态定位技术监测高层建筑风载变形·····	匡翠林, 戴吾蛟, 丁晓利, Kenny C. S. Kwok, Peter A. Hitchcock (224)
GPS 潮位提取软件的研制及其关键技术研究·····	王胜平, 赵建虎, 邵 楠 (230)
VLBI 用于绕月卫星精密定轨及月球重力场模型解算的研究·····	鄢建国, 平劲松, 唐歌实, 郑为民, 曹建峰 (234)
CORS 用于维持省级动态地心参考框架的数据处理·····	沈 飞, 李建成 (240)
连续运行参考站在省市启用 CGCS2000 中的应用·····	隋铭明, 何立恒, 沈 飞 (245)
High Frequency ERP Retrieved from GPS Data·····	DAI Chunli, PING Jinsong, ZHU Wenyao, WANG Guangli (250)
大地测量型 SVLBI 卫星坐标精度要求的估计·····	魏二虎, 程晓晖, 刘经南, 田晓静 (257)
GPS 桥梁跨河水准测量方法研究·····	吴迪军, 熊 伟, 郑 强 (263)
融合多种遥感技术监测天津地面沉降研究·····	李 陶, 张诗玉, 刘经南, 龙四春, 蒋廷臣, 夏 耶, 姜衍祥, 路 旭 (268)
宽幅 SAR 干涉测量的子条带拼接方法·····	蒋廷臣, 李 陶, 刘经南, 张诗玉, 龙四春 (274)
一种高动态 SINS/GPS 紧耦合组合导航方案·····	杨东方, 王仕成, 刘志国, 罗大成, 张金生 (278)
New GNSS Navigation Messages to Facilitate Fast TTFF and High Sensitivity·····	ZHANG Wentao, LIN Victor (285)
BD2/GPS/GLONASS 多模兼容基带芯片设计·····	张峻林 (294)
GNSS 软件接收机进展·····	刘晓莉, 刘经南, 戚战峰, 何 楠 (300)
BOC、MBOC 信号的跟踪性能分析·····	刘晓莉, 郑廷芬, 胡晰怡 (306)
基于 GPS 单频软件接收机的电离层闪烁指数计算方法研究·····	李建文, 李作虎, 郝金明, 刘伟平 (310)
GPS/GALILEO 实时软件接收机关键技术研究·····	翟传润, 孟祥夫, 李 实, 刘峻宁 (315)
MBOC: 一种新的为 GALILEO L1 OS 和 GPS L1C 建议的频谱扩展调制方式研究·····	卢 鋈 (321)
Ultra-Tightly Coupling of GNSS and INS for High Dynamic Navigation ·····	HU Rui, SHI Chuang, YANG Yunchun, ZHANG Hongping, XUE Xiaozhong (326)
Analysis of Civil Navigation Message Format for GPS Modernization·····	LU Songtao, ZHAO Yun, KOU Yanhong, HUANG Zhigang (335)
改进的最大似然 GPS 比特同步方法·····	郑 睿, 陈陌寒, 巴晓辉, 陈 杰 (341)
一种改进的 GPS 频域并行码捕获方法·····	葛 胜, 王 庆, 潘树国 (347)
数字中频 Galileo E1 信号软件模拟器设计·····	翟传润, 李 实, 刘峻宁 (352)
基于 GP2021 的 GPS 基带信号处理接口模型·····	袁兆奎, 胡丛玮, 郭 志 (357)
GPS 激光测距动态定位系统移动终端与各模块间的通信·····	白 冰, 章传银 (362)
ICCP 算法的改进及其在水下地磁匹配导航中的应用·····	赵建虎, 王爱学, 王胜平 (366)
多分辨率导航数据库及其增量更新机制·····	赵卫锋, 李必军, 杨必胜 (370)
车辆导航系统中动态信息数据组织应用方法·····	宋 莺, 李必军 (376)
基于 GPS 和 WiFi 网的组合定位算法研究·····	吴雨航, 陈秀万, 何海舰 (381)
移动应急终端协同式定位技术研究·····	褚天行, 陈秀万, 吴才聪, 汤安宁, 苏怀洪 (385)
Potential Benefits of GPS/GLONASS/GALILEO Integration in an Urban Canyon-Hong Kong ·····	Ji Shengyue, CHEN Wu, DING Xiaoli, CHEN Yongqi, ZHAO Chunmei, HU Congwei (390)
磁强计环形磁芯的磁化模型及数值仿真应用·····	刘 斯, 彭堂超, 曹大平, 蒋顺平, 蒋昌忠 (400)
磁通门磁力计探测线圈电感与磁芯的退磁系数·····	蒋顺平, 曹大平, 刘 斯 (405)
基于 GPS 和 RFID 的车辆安防研究·····	唐 健 (409)
GPS 在多目标航迹测试系统的应用·····	沈延鹏, 秦加法, 王兆华, 王 嵩 (414)
GPS 在集装箱码头的应用·····	沈延鹏, 赵呈荣, 刘 健, 庄朝文, 秦加法 (418)
基于 ARM 和航向变化信息的面阵 CCD 智能控制系统及应用·····	侯艳芳, 叶泽田, 孙立业 (422)