



ISSN 1005-6734

CODEN ZGJXAP

# 中国惯性技术学报

Journal of Chinese Inertial Technology

美国《工程索引》(Ei Compendex)收录刊源

2020.5

第28卷  
Vol.28

第5期  
No.5

2020年10月  
Oct.2020

中国惯性技术学会  
天津航海仪器研究所 主办

# 中国惯性技术学报

2020 年 10 月

第 28 卷 第 5 期

## 目 次

### · 特邀报告 ·

一种微半球谐振陀螺的制造方法与测试

..... 卢 坤, 肖定邦, 孙江坤, 石 岩, 席 翔, 吴学忠 (561)

### · 组合导航技术 ·

一种基于光流-线特征的单目视觉-惯性 SLAM 算法

..... 夏琳琳, 沈 冉, 迟德儒, 崔家硕, 蒙 跃 (568)

应用抗差估计方法构建日本海海底地形模型

..... 范 雕, 李姗姗, 孟书宇, 张金辉, 单建晨, 王傲明 (576)

基于图像语义分割的无人机自主着陆导航方法

..... 尚克军, 郑 辛, 王旒军, 龚光锋, 刘崇亮 (586)

基于惯导和激光雷达的采煤机定位方法

..... 郑江涛, 李四海, 刘士明, 付强文, 陶渊博, 李 津 (595)

基于修正观测值的水下移动节点定位算法

..... 冯国君, 单志龙, 项 婉 (603)

基于双步边缘化与关键帧筛选的改进视觉惯性 SLAM 方法

..... 张小国, 刘启汉, 李尚哲, 王 庆 (608)

一种基于证据推理的惯性/视觉里程计深组合导航方法

..... 孙 伟, 苗宏胜, 李海军, 徐海刚, 裴玉峰 (615)

基于 IMU/ODO 预积分的多传感器即插即用因子图融合方法

..... 白师宇, 赖际舟, 吕 品, 岑益挺, 王炳清, 黄 凯 (624)

一种融合语义地图与回环检测的视觉 SLAM 方法

..... 郑冰清, 刘启汉, 赵 凡, 张小国, 王 庆 (629)

## 基于智能手机的车辆多源融合导航方法

..... 纪新春, 魏东岩, 袁 洪, 周德云 (638)

### · 惯性仪表研究与设计 ·

#### 静电负刚度微机电加速度计的两种检测模式分析

..... 吴天豪, 张 晶, 朱欣华, 苏 岩 (645)

#### 一种基于集成光学芯片的微小型光纤陀螺

..... 尚克军, 雷 明, 向 强, 杨 悅, 冯 喆, 张丽哲 (650)

#### 一种基于自注入锁定的谐振式微光学院陀螺设计

..... 杨 柳, 耿靖童, 邹中星, 张勇刚 (654)

#### 一种负曲率空芯光纤的设计与性质分析

..... 杨 哲, 陈 侃, 余 玄, 毕 然, 王 磊, 舒晓武 (660)

#### 面向商业航天的基于新型固态谐振陀螺的敏感器设计

..... 李建朋, 夏 悅, 付明睿, 何树悦, 乔永昌 (666)

#### 圆片级封装全硅梳齿电容式 MEMS 加速度计设计

..... 牛昊彬, 孙国良, 王帅民, 张方媛 (672)

### · 控制与动力学 ·

#### 一种快速收敛的固定时间非奇异终端滑模控制方法

..... 田 野, 蔡远利, 邓逸凡 (677)

#### 密集场景的双通道耦合目标检测算法

..... 刘洁瑜, 魏文晓, 赵 彤, 沈 强 (686)

### · 可靠性研究 ·

#### INS/ADS/GPS 组合导航高灵敏度故障检测和识别方法

..... 李振威, 程咏梅, 刘 刚, 徐 铭, 冯鑫涛 (694)

期刊基本参数: CN12-1222/O3\*1989\*b\*A4\*zh\*P\*¥60\*1100\*20\*2020-10

## CONTENTS

### • Special Report •

Fabricating method and testing of a micro hemispherical resonator gyroscope

.....LU Kun, XIAO Dingbang, SUN Jiangkun, SHI Yan, XI Xiang, WU Xuezhong (561)

### • Integrated Navigation Technology •

An optical flow-line feature based monocular visual-inertial SLAM algorithm

.....XIA Linlin, SHEN Ran, CHI Deru, CUI Jiashuo, MENG Yue (568)

Applying robust estimation method to estimate seafloor topography in the sea of Japan

.....FAN Diao, LI Shanshan, MENG Shuyu, ZHANG Jinhui, SHAN Jianchen, WANG Aoming (576)

Image semantic segmentation-based navigation method for UAV auto-landing

.....SHANG Kejun, ZHENG Xin, WANG Liujun, HU Guangfeng, LIU Chongliang (586)

Positioning method of a shearer based on inertial navigation and lidar

.....ZHENG Jiangtao, LI Sihai, LIU Shiming, FU Qiangwen, TAO Yuanbo, LI Jin (595)

A localization algorithm based on modified observations for underwater mobile nodes

.....FENG Guojun, SHAN Zhilong, XIANG Wan (603)

An approach to improve VI-SLAM based on two-step marginalization and keyframe selection method

.....ZHANG Xiaoguo, LIU Qihan, LI Shangzhe, WANG Qing (608)

An INS/visual odometer deeply integrated navigation method based on evidence reasoning

.....SUN Wei, MIAO Hongsheng, LI Haijun, XU Haigang, PEI Yufeng (615)

Multisensory plug-and-play factor graph fusion method based on IMU/odometer preintegration

.....BAI Shiyu, LAI Jizhou, LV Pin, CEN Yiting, WANG Bingqing, HUANG Kai (624)

Loop detection and semantic mapping algorithm fused with semantic information

.....ZHENG Bingqing, LIU Qihan, ZHAO Fan, ZHANG Xiaoguo, WANG Qing (629)

Vehicle multi-source fusion navigation method based on smartphone platform

..... JI Xinchun, WEI Dongyan, YUAN Hong, ZHOU Deyun (638)

### • Inertial Instrument Research and Design •

Analysis of two detection modes of electrostatic negative stiffness MEMS accelerometer

..... WU Tianhao, ZHANG Jing, ZHU Xinhua, SU Yan (645)

An integrated optical chip based miniature fiber optic gyroscope

..... SHANG Kejun, LEI Ming, XIANG Qiang, YANG Yi, FENG Zhe, ZHANG Lizhe (650)

Design of a resonant micro-optical gyro based on self-injection locking

..... YANG Liu, GENG Jingtong, GAO Zhongxing, ZHANG Yonggang (654)

Design and property analysis of a negative-curvature hollow core fiber

..... YANG Zhe, CHEN Kan, SHE Xuan, BI Ran, WANG Lei, SHU Xiaowu (660)

A novel solid state resonator gyroscope sensor design for commercial aerospace

..... LI Jianpeng, XIA Yue, FU Mingrui, HE Shuyue, QIAO Yongchang (666)

A design of capacitance MEMS accelerometer with wafer level encapsulated all-silicon comb tooth

..... NIU Haobin, SUN Guoliang, WANG Shuaimin, ZHANG Fangyuan (672)

### • Control and Dynamics •

A fast-nonsingular terminal sliding mode control method with fixed-time stability guarantees

..... TIAN Ye, CAI Yuanli, DENG Yifan (677)

Dual-channel coupled target detection algorithm with dense scene

..... LIU Jieyu, WEI Wenxiao, ZHAO Tong, SHEN Qiang (686)

### • Reliability Research •

High-sensitivity fault detection and identification method for INS/ADS/GPS integrated navigation

..... LI Zhenwei, CHENG Yongmei, LIU Gang, XU Ming, FENG Xintao (694)